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Chenopodiaceae and Amaranthaceae of New York State

Steven E. Clemants
Brooklyn Botanic Garden

Contributions to a Flora of New York State X
Richard S. Mitchell, Editor

1992

BULLETIN NO. 485

NEW YORK STATE MUSEUM

The University of the State of New York
THE STATE EDUCATION DEPARTMENT
Albany, New York 12230

THE NEW YORK BOTANICAL GARDEN

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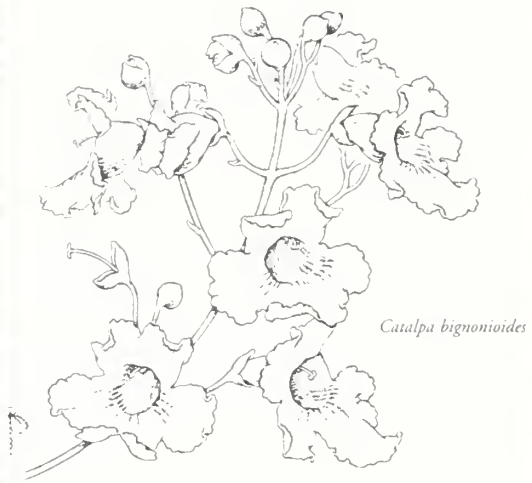

Catalpa bignonioides

Gift of
Rupert C. Barneby
"Cherished during his watch"

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PREFACE

OUR GOAL in producing this series is to present a useful and authoritative account of the plants of New York State. These contributions are intended to reflect the knowledge and taxonomic opinions of specialists who prepare the manuscripts while following a generalized format for consistency. Inclusion of ecological, distributional, medical and economic information on each species is also one of our major aims. Habitat references, flowering times, pertinent synonymy, etc., often apply specifically to New York plants rather than to the entire species. Complete illustration should facilitate identification of specimens for those who are not formally trained in botany. Descriptions are original, ordered and as complete as possible to provide sequential cross-referencing.

Distribution maps accompany species of seed plants, ferns, mosses, algae, lichens and some groups of fungi. These are plotted by counties to eliminate pinpointing endangered habitats, while offering an accurate visual picture of past collecting. Maps are based on the master file at the New York State Museum, Albany, supplemented by available data (specimens examined by the authors) from herbaria housing significant New York collections. Data or literature citations for any map may be obtained, on approval, from the State Museum. We hope that these bulletins will serve individuals with interest in the flora, as well as to provide information for state and Federal agencies, conservation organizations, industry and the scientific community. With these works go our hopes for the preservation and wise use of a precious and life-giving resource — our State's plant life.

The New York State Flora Committee

The steering council of the New York State Flora Committee met for the first time on January 19, 1976, and established as its goals the promotion of study of the State's plant resources and the publication of this series of museum bulletins. These contributions will be continually updated after publication for possible incorporation into larger volumes at a later date.

Members of the council at the time of this publication are:

Richard S. Mitchell, Chairman, State Botanist, N. Y. State Museum, Albany (Vascular Plants)
Charles J. Sheviak, Curator of Botany, N. Y. State Museum, Albany (Vascular Plants)
Norton G. Miller, N. Y. State Biological Survey, Albany (Bryophytes)
Clark T. Rogerson, The New York Botanical Garden, Bronx (Fungi)
George J. Schumacher, Biology Dept. SUNY, Binghamton (Algae)
Gordon C. Tucker, N. Y. State Museum, Albany (Vascular Plants)

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The illustrations in this treatment are by Anthony Salazar. I thank Dick Mitchell for suggestions and encouragement throughout the project. I would like to express my gratitude to the staff and curators of the following institutions for their cooperation and hospitality when I visited their collections: The New York State Museum (NYS), The New York Botanical Garden (NY), Cornell University (BH), Philadelphia Academy of Science (PH), Rochester Academy of Science (ROCH), SUNY-ESF, Syracuse (SYR), The Buffalo Museum of Science (BUF) and the herbaria of Harvard University (A, GH). I also thank Kerry Barringer, curator of the herbarium at Brooklyn Botanic Garden for arranging the loan of specimens from some of the above mentioned herbaria. Label data from these collections have been transcribed and will be transferred into the master file of plant distribution at the New York State Museum. The classification system employed in this flora is that of Arthur Cronquist (1981).

IMPORTANT NOTE

All economic uses, folklore, medical and pharmaceutical notes, uses as foodstuffs, etc., are compiled from the literature and do not represent an endorsement by the authors or the New York State Museum. Some of the uses may, indeed, be dangerous if incorrectly employed. Some are not effective and are presented for historical interest only.

LEGEND

FOR ALL MAPS IN THE FOLLOWING PUBLICATION THE FOLLOWING SYMBOLS APPLY

Solid dot—specimen seen by author: data on file at the State Herbarium (NYS)

Circle—field observation or literature citation with location data and observer's or author's name on file (NYS)

FOR ALL ILLUSTRATIONS IN THIS PUBLICATION, THE FOLLOWING LETTER-DESIGNATIONS APPLY:

A. Habit sketch
B. Root
C. Leaf
D. Inflorescence(s)
E. Inflorescence node
F. Bracteoles
G. Flower
H. Fruiting calyx
I. Fruit
J. Seed

Chenopodiaceae (Goosefoot Family)

The Chenopodiaceae: a family of about 100 genera and 1,500 species of herbs and shrubs worldwide. The group is cosmopolitan in distribution and particularly diverse in arid areas. A number of species are halophytic, and many are weeds within and outside of their natural ranges. Goosefoot (*Chenopodium album* L.), one of the more widespread and common weeds of the world, has followed in the footsteps of man since prehistory, and is sometimes used as a pot herb. Quinoa (*Chenopodium quinoa* Willd.), is a pseudo-cereal staple food in the Andes, and the fruits of some other species of the genus have been eaten, occasionally. Spinach (*Spinacia*) is widely used as a salad green and pot herb. Beet (*Beta*) is used as a pot herb (Swiss chard); the roots are eaten as a vegetable (garden beet), and it may serve as a source of sucrose and glucose (sugar beet). Several genera (particularly *Salsola*, *Salicornia* and *Suaeda*) have been used as sources of soda for the production of soap and glass. Pollen grains of the Chenopodiaceae (and many Amaranthaceae) are unusual in being spherical with numerous surface pores (sometimes called "golf-ball pollen"). Many species of both families are known for the aeroallergenic nature of their pollen. Historically, pollen of the Chenopod/Amaranth type has been found in Maestrichian deposits, representing the oldest fossil records of Caryophyllidae. In addition to their pollen, many genera of Chenopodiaceae share other morphological similarities with those of Amaranthaceae, thus, confounding a clear distinction between the families.

The chenopods have been classified in several ways. One recent study (Scott, 1977a) suggested that they be split into three families: Chenopodiaceae, Salsolaceae and Salicorniaceae. Although habit and embryo shape have been used for decades as characters to distinguish these subgroups, these characters are considered by most taxonomists insufficient to warrant the recognition of separate families.

FAMILY DESCRIPTION

A family of annual and perennial herbs and shrubs (rarely trees), sometimes with fleshy, nearly leafless stems. The leaves are alternate (rarely opposite), simple, entire, toothed or lobed, often somewhat succulent, ranging from papery and flat to very fleshy and terete. Leaves are sometimes reduced to sheaths at the nodes, and stipules are lacking. The inflorescences are usually composed of glomerules (congested cymes in the leaf axils), or the glomerules are often borne in compound spikes, panicles or cymes. Occasionally, the inflorescence is not glomerulose, but a simple panicle or spike. Each flower is subtended by a bract and two bracteoles (or the bract, bracteoles or both may be absent). Flowers are small, usually regular, perfect or less often unisexual, the plants then monoecious or dioecious. There are (1-) 5 (-6) sepals, or sometimes the sepals are absent in staminate flowers. The sepals are distinct or connate (usually only at the base), usually herbaceous or membranaceous, rarely scarious. Stamens are commonly the same number as the tepals and opposite them, their filaments free or connate at the base, inserted on a disc on the calyx or hypogynous. The anthers are tetrasporangiate and dithecal. The ovary is usually superior (semi-inferior in *Beta*), 1-locular, 2-3 (-5) carpellate, the ovules solitary, basal, amphitropous or usually campylotropous, bitegmic, crassinucellar. Styles are 1-3, distinct or more or less connate; stigmas are mostly 2-3, dry. The fruit is a utricle or nutlet, usually indehiscent, seldom with irregular or circumscissile dehiscence, often subtended by the persistent calyx or by persistent bracteoles. Sometimes, several fruits are aggregated by connation of the somewhat fleshy tepals. The seeds are mostly lenticular, each with an annular, spirally twisted or only slightly curved peripheral embryo, surrounding the usually abundant, starchy, hard perisperm. True endosperm is vestigial or absent.

KEY TO GENERA

1. Leaves reduced to a sheath surrounding the stem, with 2 appressed, opposite scales at the apex; flowers in threes, sunken into the jointed, succulent stem ..... 1. *Salicornia*
1. Leaves not reduced to a sheath; flowers not sunken into a jointed, fleshy stem ..... (2)
   2. Bracteoles enlarged and accrescent in fruit; flowers unisexual ..... (3)
   2. Bracteoles not enlarged or accrescent in fruit; flowers perfect (except in *Axyris* where they are unisexual) ..... (4)
3. Bracteoles free, at least at their apex; stigmas 2-3 ..... 2. *Atriplex*
3. Bracteoles fused up to the apex; stigmas 4-5 ..... 3. *Spinacia*
   4. Fruit dehiscent; ovary semi-inferior; roots often enlarged ..... 4. *Beta*
   4. Fruit indehiscent; ovary superior; roots not notably enlarged ..... (5)
5. Leaves filiform to linear, linear-lanceolate, or linear- oblong, entire; sessile ..... (6)
5. Leaves lanceolate to ovate, entire, toothed, or lobed; petioled (or the upper leaves sessile) ..... (11)

6. Leaves spine-tipped, the principal ones filiform; seed orbicular or ovoid, not lenticular; embryo spiralled .....5. *Salsola*
6. Leaves not spine-tipped, at most subulate-pointed; seeds lenticular; embryo ring-shaped, horseshoe-shaped or coiled.(7)
7. Leaves thick and somewhat fleshy, terete or plano-convex in cross-section; embryo coiled; flowers commonly 3 in the axils of leaves .....6. *Suaeda*
7. Leaves scarcely fleshy, flat, at least toward the base; embryo ring-shaped; flowers borne variously .....(8)
8. Calyx forming lateral (horizontal) wings or spines in fruit; leaves pubescent .....7. *Bassia*
8. Calyx without lateral spines in fruit, lacking a margin or with vertical, winged keels; leaves variously pubescent or glabrous .....(9)
9. Flowers with 1 sepal; fruit usually with a vertical winged margin .....8. *Corispermum*
9. Flowers with 3-5 sepals or sepal lobes; fruit without a margin .....(10)
10. Sepals fused at the base, not imbricate .....13. *Chenopodium*
10. Sepals imbricate .....9. *Polycnemum*
11. Leaves and stems stellate-pubescent; flowers unisexual .....10. *Axyris*
11. Leaves variously pubescent or glabrous, but not stellate pubescent; flowers perfect or occasionally pistillate .....(12)
12. Fruiting calyx with a broad, lateral wing; inflorescence a diffuse panicle .....11. *Cycloloma*
12. Fruiting calyx wingless or nearly so, sometimes with a vertical, winged keel; inflorescence often consisting of clustered glomerules .....(13)
13. Sepal 1 per flower .....12. *Monolepis*
13. Sepals 5 per flower .....13. *Chenopodium*

1. SALICORNIA

Common Names: Glasswort, Saltwort

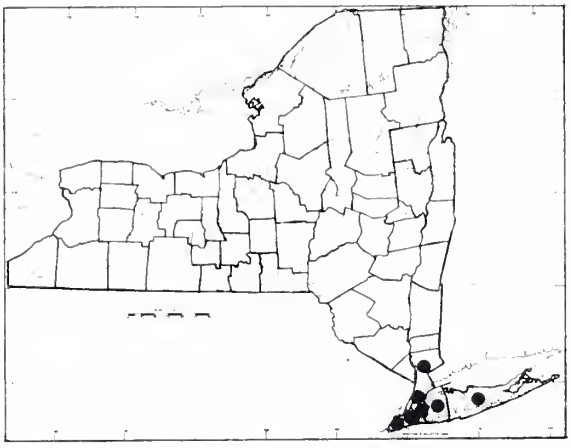
Authority: Linnaeus, Species Pl. 1, p. 3, 1753

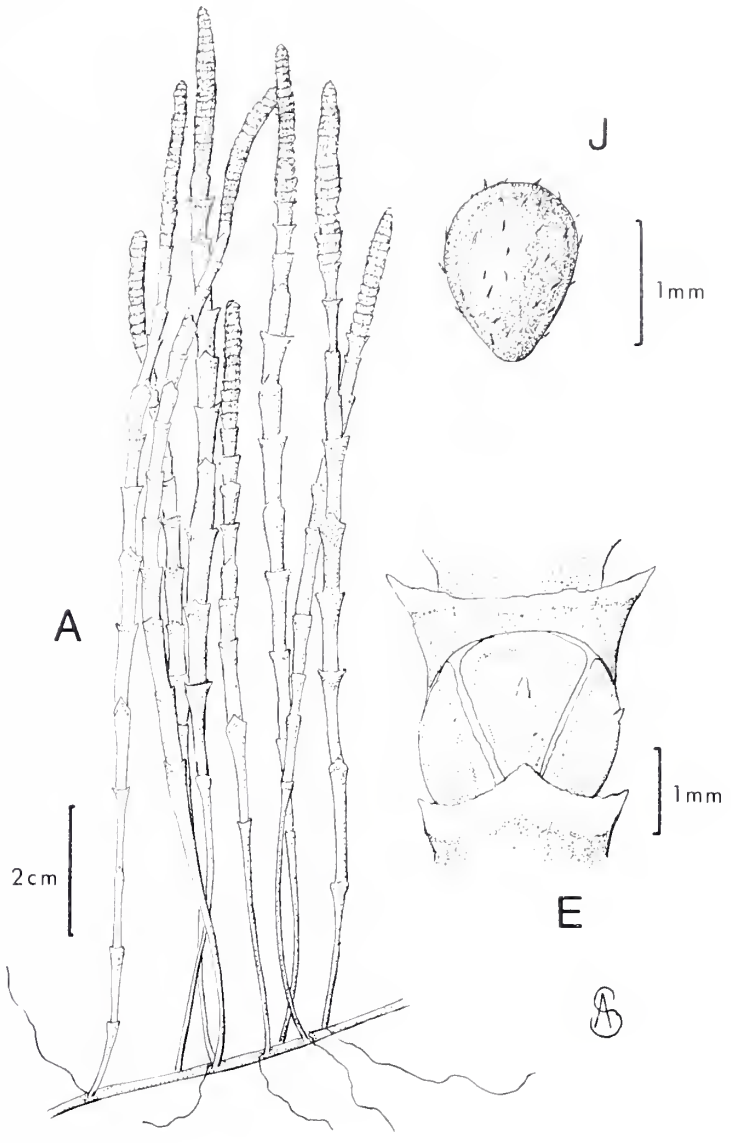
A genus of as few as 13, or up to 35 species, depending upon taxonomic interpretation. In the broad sense of the group, adopted here, the genus is cosmopolitan along sea coasts and in other brackish habitats. The glassworts and saltworts are easily recognized by their jointed, fleshy stems, opposite scales, and fleshy spikes. Scott (1977a) split the genus, segregating (as *Sarcocornia*), members differing in their perennial habit and inflorescence structure. While these characters are sufficient for subgeneric delimitation, the segregation of genera within this easily recognized group seems to serve little purpose, and is not followed here. Three species of *Salicornia* occur within our range, and a fourth, *S. rubra* L., is widely scattered in central North America. *Salicornia* plants were once burned and their ashes used as a source of soda in the production of soap and glass, hence the name glasswort. Sometimes known as samphire greens, they have also been used as food.

Description: Plants with **bisexual** or **pistillate** flowers (when polygamomonoecious); **stigmas** 2, subulate; **style** 1, lacerate above or ending in stigmas; **ovary** 1, superior, ovoid, unilocular with a single, basal **ovule**; **fruit** an indehiscent utricle sunken into the fleshy spike and surrounded by the perianth, the pericarp membranaceous, non-adherent, closely investing the seed and nearly the same size; **seed** 1, vertical, homomorphic, minutely hairy; **embryo** conduplicate; **perisperm** none; **radicle** inferior; **stamens** 1-2, hypogynous; **filaments** membranaceous, linear; **anthers** tetrasporangiate; **calyx** obpyramidal, usually truncate at the summit and 3-4 lobed, fleshy or herbaceous, spongy in fruit, opening by a small terminal slit only; **bracts** scale-like, sometimes fused and forming a shallow cup; the **flowers** in groups of three, sessile and sunken into the fleshy rachis; **inflorescence** terminal, in cylindrical spikes; **leaves** reduced and fused into a fleshy sheath surrounding the stem, with minute, opposite, scarcely projecting scales at the point of attachment; **stems** succulent, herbaceous or sometimes slightly woody, erect or sprawling, branched; **annuals** or **perennials** with a taproot or horizontal rhizome.

KEY TO SPECIES

1. Plants annual from a taproot; the central flower of each cluster longer than the 2 lateral ones .....(2)
1. Plants perennial from a horizontal rhizome; central flower of the cluster not noticeably prominent .....1. *S. perennis*
2. Scales acute to acuminate, mucronate; spike inflated, wider than the stem .....2. *S. bigelovii*
2. Scales acute to rounded, not mucronate; spike usually not wider than the stem .....3. *S. europaea*





1. *Salicornia perennis* Miller

Common Names: Saltwort, Glasswort, Samphire, Leadgrass

Type Description: Miller, Gard. Dict. ed. 8, *Salicornia* no. 2, 1768

Synonyms: *Arthrocnemum perenne* (Miller) Moss, *Salicornia virginica of* authors, not L., *Sarcocornia perennis* (Miller) A. J. Scott

Origin: Native to the Atlantic Coasts of Europe and North America

Habitats: Sea beaches and salt marshes

Habit: Prostrate, succulent subshrub with ascending to erect branch tips

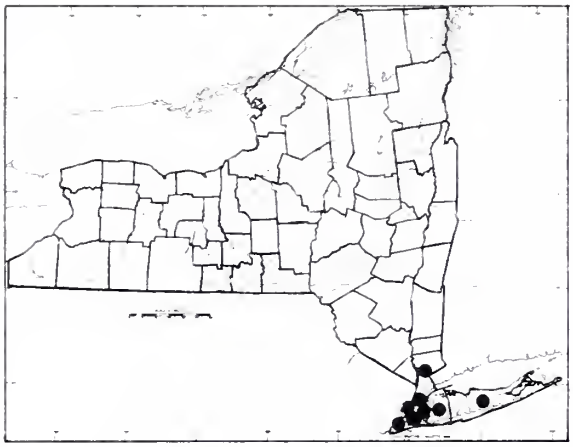
Flowering: July-September

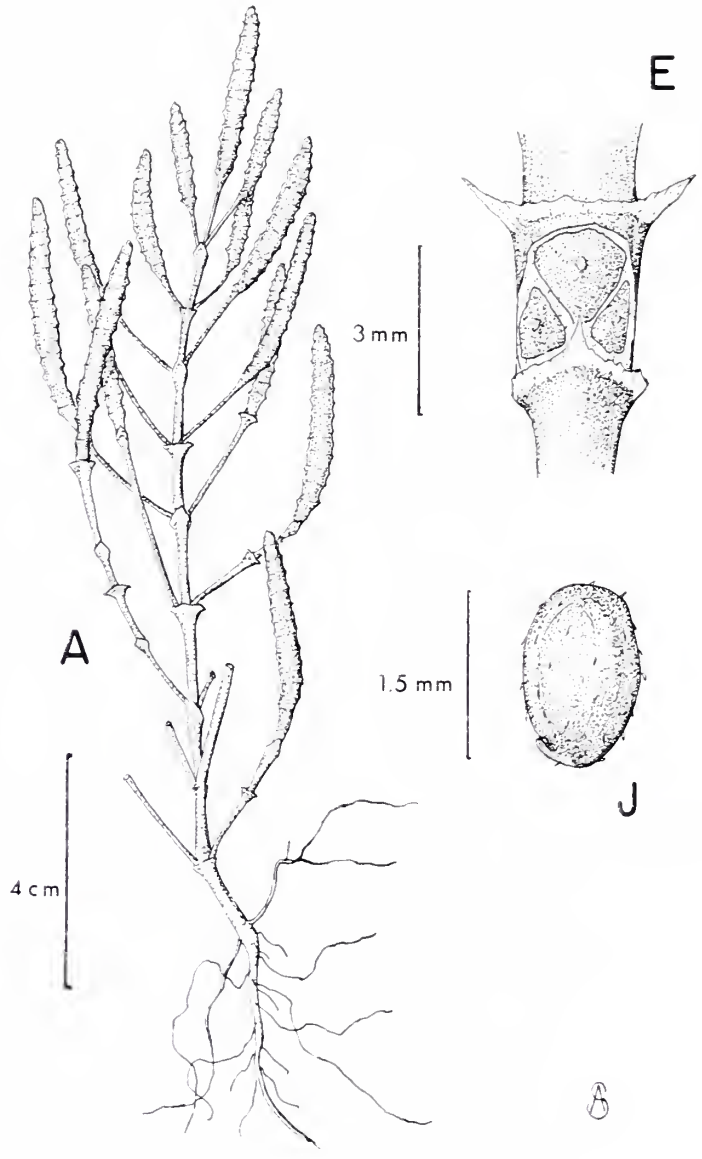
Fruiting: September-November

General Distribution: Europe, Africa and North America; in North America: along the Atlantic Coast from southern New Hampshire to South Carolina

Description: Plants with **bisexual** flowers; **stigmas** spreading, 0.3-0.6 mm long; **style** 0.4-0.8 mm long; **fruit** oblong or ellipsoid; **seed** greenish-brown to gray, oblong or ellipsoid, 1.2-1.4 mm long, 0.6-0.8 mm broad, testa covered with slender curved hairs; **stamens** 2; **filaments** 0.3-0.5 mm, usually not visible from outside the flower; **anthers** obovoid, yellowish, 0.6-0.8 mm long; **calyx** fleshy, 3-4-lobed, 0.8-1.0 mm long, central and lateral flowers 1.2-1.5 mm tall, 0.8-1.1 mm broad, subequal or usually the central larger than the lateral, the central flower cuneate-obovate, truncate across the top, extending over half way to the top of the joint, lateral flowers obliquely ovate; **inflorescence** erect, cylindrical spikes, 15-50 cm long, the individual joints 1.8-2.8 mm long, 2.0-2.2 mm broad; **inflorescence scales** broadly deltate or forming a shallow cup, 1.1-1.5 mm long, 2.5-2.7 mm broad, apex acuminate; **stems** hard and woody (at least the lower portion), prostrate, rooting, forming mats 1 meter or less in diameter, with erect or ascending non-flowering and flowering stems fleshy, 1-3 dm tall, joints 6-20 mm long, 1-3 mm broad, scales rounded to acute, from a **perennial** rhizome with fibrous, adventitious **roots** (2n = 18).

Nomenclatural Note: This species has often been treated under the Linnaean name *Salicornia virginica* L. but Ball (pers. comm.) has checked the type of *S. virginica* and found it to be annual, therefore rendering this binomial invalid for this plant. The North American plants may not be conspecific with European *S. perennis*, but, until comparisons of living materials of the American and European plants have been made, I am retaining American populations under the name *S. perennis*.





2. *Salicornia bigelovii* Torr.

Common Names: Saltwort, Glasswort, Samphire

Type Description: Torrey, Bot. Mex. Bound. Surv. p. 184, 1859

Origin: Native to northern North America, particularly along the coasts

Habitats: Tidal marshes, shores and swales, inland salt lake shores and alkaline flats

Habit: Simple-stemmed or branched, succulent annual herbs

Flowering: July-September

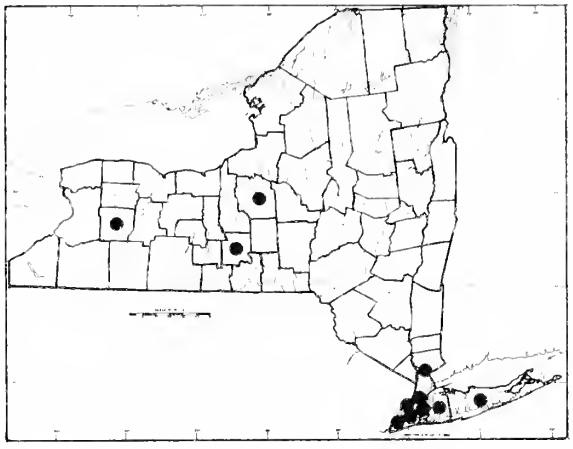
Fruiting: August-November

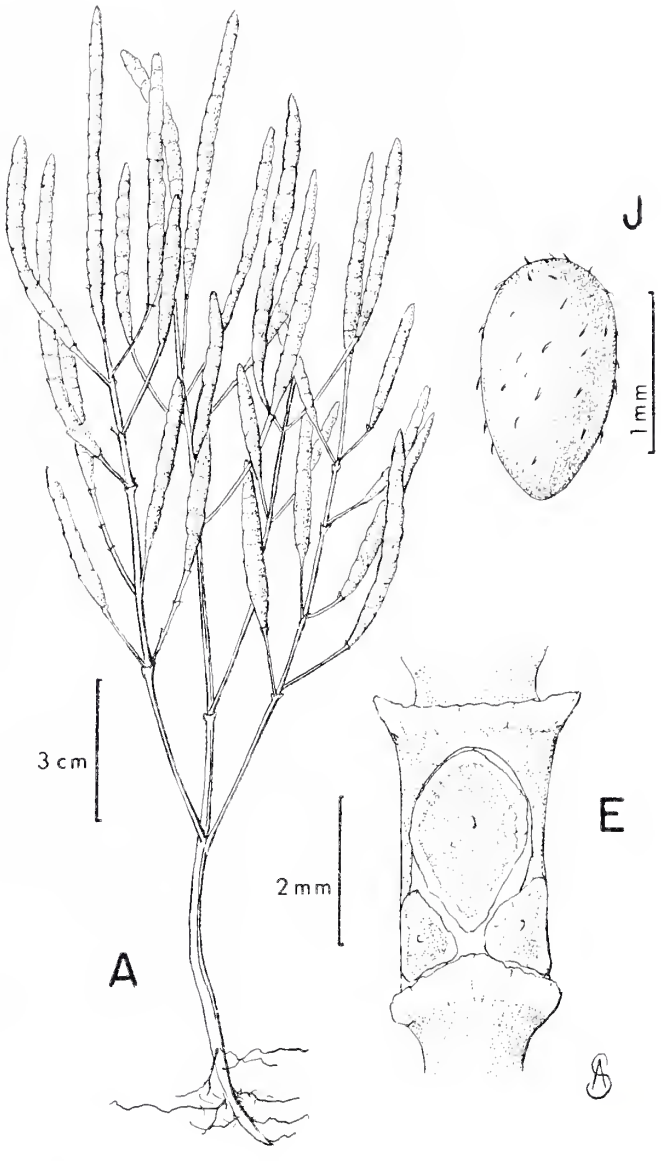
General Distribution: Atlantic coast from southern Maine to South Carolina, west to Utah and the Pacific coast, from northern British Columbia south to Baja California

Rarity Status: This species is ranked G5Q S3 by the New York Natural Heritage Program and placed on their watch list.

Description: Plants with **bisexual** flowers; **stigmas** erect to spreading, 0.4-0.5 mm long; **style** 0.2-0.4 mm long; **fruit** ovoid to oblong; **seed** greenish to nearly black, ovoid to oblong, 1.6-2.0 mm long, 1.0-1.2 mm broad, testa covered with short curved hairs; **stamens** 1; **filaments** 1.0-1.2 mm long; **anthers** oblong, yellowish, 0.4-0.7 mm; **calyx** herbaceous, 3-lobed, 0.9-1.1 mm long, the central flower 1.7-1.8 mm tall and 1.3-1.5 mm broad, lateral flowers 1.1-1.2 mm tall and 0.7-1.5 mm broad, the central flower extending nearly or quite to the top of the joint, lateral flowers contiguous below the acute lower angles of the central ones; **inflorescences** erect, cylindrical spikes 2-12 cm long, apex obtuse, the individual joints 1.2-3.5 mm long, 2-6 mm broad, usually much wider than long; **inflorescence scales** triangular, 1.5-3.0 mm long, 2.0-4.8 mm broad, often hiding the flowers, acute, mucronate; **stems** succulent, erect, 0.7-2.0 dm tall, green, usually simple at the base, sparsely to copiously branched above, the branches ascending or rarely spreading, stem joints 7-25 mm long, 2-3 mm broad, the sheaths with 2 sterile scales at the summit, sterile scales 2.9-3.5 mm long and 1.8-3.5 mm broad; **root system** annual with a narrow taproot 2-5 cm long and numerous lateral roots ($2n = 18$).

Importance: *Salicornia bigelovii* is currently being studied as a potential source of vegetable oil (Glenn *et al.*, 1991). The seeds contain 26-33 percent oil, 31 percent protein, and are low in fiber and ash. The yield equals or exceeds that of oil crops such as soybean and sunflower, and the plant grows in high salinity areas.





3. *Salicornia europaea* L.

Common Names: Glasswort, Samphire, Chicken-claws

Type Description: Linnaeus, Species Pl. I, p. 3. 1753

Synonyms: *Salicornia europaea* var. *simplex* (Pursh) Fern., *S. prostrata* Pall.

Origin: Native to the Atlantic coast of North America

Habitats: Salt marshes

Habit: Erect to prostrate, annual herb

Flowering: July-September

Fruiting: August-November

General Distribution: In North America from Nova Scotia to Georgia along the coast and inland in saline habitats to Michigan, Wisconsin and Illinois; Europe, Asia and North Africa

Description: Plants with **bisexual** flowers; **stigmas** erect or spreading, 0.2-0.3 mm long; **style** ca. 0.1 mm long; **fruit** oblong to ovoid; **seed** brown, oblong or ovoid, 1.0-1.5 mm long, 0.6-0.8 mm broad, testa covered with short curved hairs; **stamens** 1, rarely 0 or 2; **filaments** 0.3-0.8 mm long; **anthers** oblong, light yellow, 0.3-0.4 mm long; **calyx** herbaceous, 3-lobed, 0.5-0.7 mm long, central flower broadly obovate, 2.0-2.5 mm tall, 1.4-1.5 mm broad, much higher than the lateral flowers and reaching two thirds the distance to the apex of the joint, lateral flowers broadly obovate, 1.2-1.5 mm tall, 0.8-1 mm broad, contiguous below the acute lower angles of the central ones; **inflorescences** erect, cylindrical spikes, 2.5-6.0 cm tall, tapering above, individual joints 2.2-4.0 mm long, 1.5-2.2 (-4.5) mm in diameter, scales obtuse or rounded; **inflorescence scales** very broadly ovoid or forming a shallow cup, 1.0-1.7 mm long, 2.3-2.9 mm broad, apex acute to rounded; **stems** erect, 1-5 dm tall, green becoming red or reddish with age, often simple at the base, usually much-branched above, the branches erect or ascending, joints 5-22 mm long, 1.0-2.5 mm diameter, often reddish in age, the sheaths with two scales at the summit, scales broadly acute, 1.0-1.5 mm long, 1.0-1.5 mm broad; **root system** a slender, annual taproot with numerous lateral fibrous roots (2n = 36).

Nomenclatural Note: This species belongs to a complex group of diploid and tetraploid plants often treated under the inclusive name *S. europaea* L. Typical *S. europaea* (in the narrow sense) is a diploid from northern Europe, but plants ranging along the Atlantic coast south of Canada are tetraploid (Ball, pers. comm.), and would not be placed within *S. europaea* if interpreted in the narrowest sense. The American taxon may be conspecific with a group of European tetraploid annuals, but no studies have been done. If it is not conspecific with any European taxon, then it should be called *S. virginica* L. That binomial has usually been used

for the perennial American plant (here called *S. perennis*), but Ball (pers. comm.) has checked the type of *S. virginica* and found that it is annual. It therefore bears the earliest name for the American tetraploid annual taxon. I have not followed this name change because the American and European populations have not been studied together. Their relationships have not been resolved, and the nomenclature is still confusing. I am, therefore, using *S. europaea* in the broadest, inclusive sense, with the expectation that it may change in the future.

Importance: The fleshy stems of glasswort have culinary importance in France where they are used in several sophisticated recipes. The young stems are also made into pickles in England and Syracuse, New York, and they have, occasionally, been made into salads or used as a garnish. Samphire greens were boiled and served as a survival food for settlers of remote places, particularly in Canada, where their image appears on the Steeves family crest. The plants were also used in medicine (called *herba salicorniae herbaceae*), and occasionally as a source of soda ash for making soap and glass.

2. ATRIPLEX

Common Names: Orach, Salt-bush, Tumbleweed, Atriplex

Authority: Linnaeus, Species Pl. II, p. 1052. 1753

A genus of over 250 species of cosmopolitan distribution, but mainly subtropical and arid-temperate. Many species are halophytes of coastal or inland saline habitats, but a few species are widespread weeds on disturbed soils. A few species are cultivated as ornamentals and pot herbs (particularly *A. hortensis*), while several others are important forage plants. The genus is distinctive among our chenopods because of the accrescent bracteoles that surround the fruit. The species are often considered difficult to distinguish, with hybrids cited as part of that problem (particularly hybrids between *A. patula* and *A. prostrata*), but much of the confusion has been due to the plasticity of the leaves of members of those groups and not to their hybridization. Because the most consistent characters are those of the mature bracteoles, ripe, fruiting specimens should be used for identification whenever possible. Many species have C4-photosynthesis and have a distinctive, net-like venation pattern (kranz-type venation), that can usually be seen by scraping off the surface pubescence of the leaf.

Description: Plants **monoecious** or **dioecious**; **female flowers:** monomorphic or dimorphic: when dimorphic sometimes of two sizes, or with horizontal and vertical seeds; **stigmas** 2, sub-filiform, thickened or compressed toward the connate bases; **style** 1 or absent; **ovary** 1, superior, unilocular with a single, basal **ovule**; **fruit** an indehiscent utricle, surrounded by enlarged bracteoles, the pericarp membranaceous, usually non-adherent but closely investing the seed, the fruit therefore nearly the same size as the seed; **seed** 1, usually vertical, homomorphic or dimorphic (small and black or large and brown), erect or inverted, rarely horizontal (in perianth-bearing flowers), lenticular, testa glabrous; **embryo** annular, surrounding an abundant, farinaceous **perisperm**, the **radicle** inferior, lateral or superior; **calyx** usually absent, sometimes 3-5 lobed and membranaceous, rarely of 1-5 scale-like sepals; **bracteoles** 2, accrescent, distinct or usually united at the base and enclosing the fruit, herbaceous, spongy or cartilaginous, entire or toothed, the dorsal surface smooth or variously appendaged; **male flowers: ovary** rudimentary or absent; **stamens** 3-5, hypogynous; **filaments** linear, distinct or connate at the base; **anthers** tetrasporangiate; **calyx** 3-5 lobed; **bracteoles** lacking; **bracts** absent or subtending glomerules only; **inflorescences** terminal or axillary spikes, panicles or axillary glomerules, the flowers solitary or clustered in glomerules, staminate and pistillate flowers in the same glomerule or glomerules wholly staminate towards the tips; **leaves** opposite or alternate, herbaceous, sessile or petioled, venation of the kranz-type or normal dicotyledonous type; **stems** herbaceous or woody (shrubby), more or less scurfy, farinose or furfuraceous with vesicular hairs; **root systems** annual or perennial.

KEY TO SPECIES

1. Principal leaves with serrate margins; blades with net-like, kranz-type venation (may require scraping surface to see).....(2)
1. Principal leaves entire or with only two teeth towards the base; blades lacking kranz-type venation .....(3)
   2. Flowers borne primarily on terminal, bractless, often long spikes, rarely with a few axillary glomerules .....1. *A. tatarica*
   2. Flowers borne primarily in axillary glomerules, except for a short, terminal, male spike .....2. *A. rosea*
3. Principal lower leaves linear to lanceolate or elliptic; leaf bases cuneate.....(4)
3. Principal lower leaves ovate to triangular; leaf bases subcordate, truncate or broadly cuneate.....(7)
   4. Bracteoles obtriangular, broadest above the middle, with 3-5 teeth toward the apex; leaves densely pubescent .....3. *A. arenaria*
   4. Bracteoles broadly ovoid, triangular or diamond shape, broadest at or usually below the middle, without teeth along the apex; leaves sparsely pubescent.....(5)

5. Infloreseence with leafy bracts throughout; black seeds rare or absent; brown seeds with the radicle strongly ascending .....4. *A. glabriuscula*

5. Infloreseence with leafy braets only at the base; black seeds common; brown seeds with the radicles not strongly ascending .....(6)

6. Braeteoles broadly triangular to ovate-triangular, usually thick with well-developed spongy inner layer (sometimes lacking); leaves linear to linear-laneeolate; brown seeds 2-3 mm wide, broadly elliptic, more or less basally flat, the radicle median, ascending to pointing outward with the apex eurved inward .....5. *A. subspicata*

6. Bracteoles rhombic-triangular to triangular-hastate, always thin and lacking a spongy inner layer; leaves linear- lanceolate to lanceolate; brown seeds 2.5-3.1 (3.7) mm wide, round, not basally flattened, the radiele subbasal, aseending with apex pointed .....6. *A. patula*

7. Fruiting braeteoles orbicular or rounded-ovate, 10 mm broad or more, eonspieuously reticulate-veined; seed apparently centrally plaeed within the bracteoles .....7. *A. hortensis*

7. Fruiting bracteoles triangular or rhomboidal, less than 5 mm broad, not eonspieuously veined; seed basally plaeed within the bracteoles .....(8)

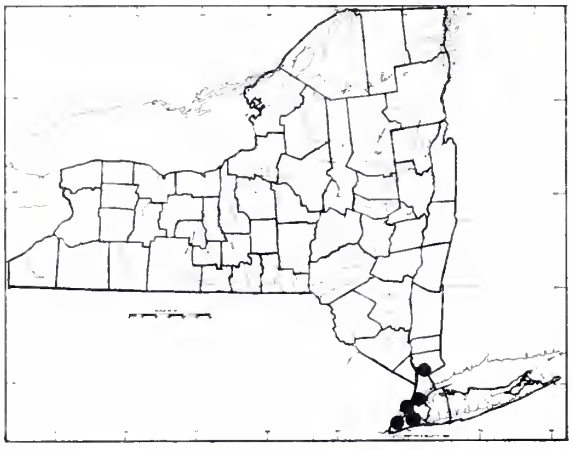
8. Infloreseenees with leafy bracts only at the base .....(9)

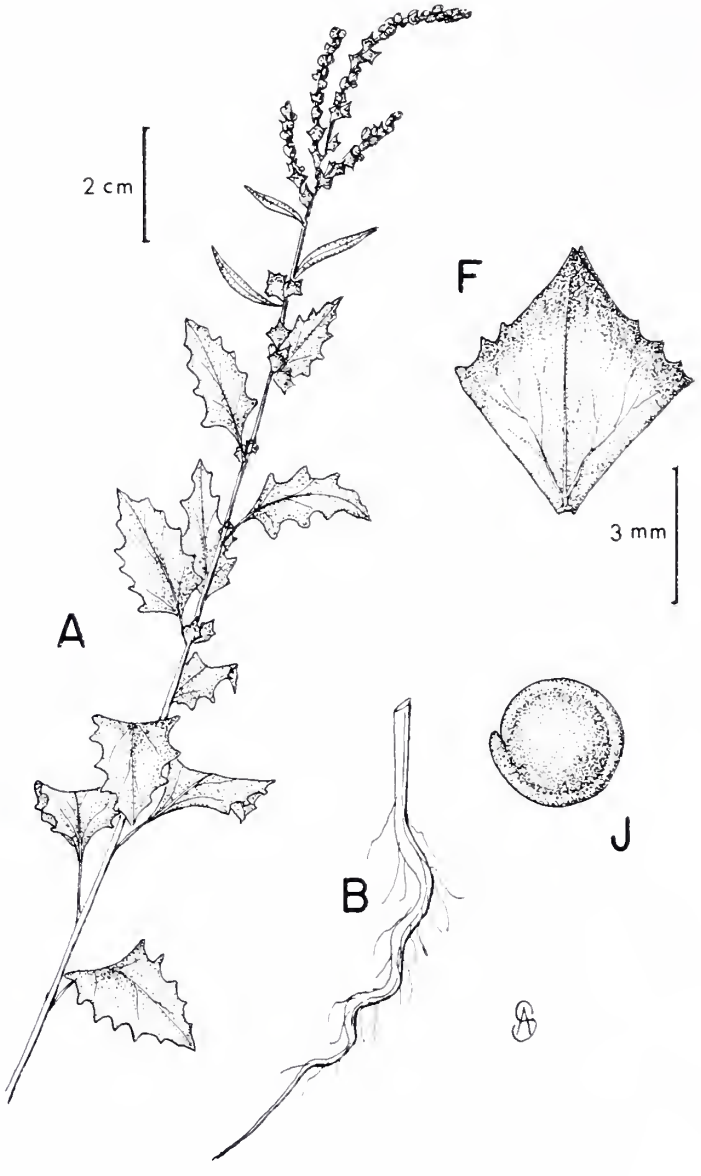
8. Infloreseenees with leafy braets throughout .....4. *A. glabriuscula*

9. Prineipal leaves usually laneeolate with two teeth pointing towards the apex; braeteoles without a spongy inner layer, rhombie-triangular to triangular-hastate with prominent lateral angles .....6. *A. patula*

9. Prineipal leaves triangular-hastate, usually with two teeth pointing towards the base; bracteoles with inner spongy layer present (sometimes weakly developed), triangular-hastate to triangular-ovate or broadly ovate; with prominent basal angles .....8. *A. prostrata*

Note: Because fruit and seed measurements are virtually the same in this genus, only the seed sizes are given in the deseriptions that follow.





1. *Atriplex tatarica* L.

Common Names: Tartarian Saltbush, Orach, Atriplex

Type Description: Linnaeus, Species Pl. II, p. 1053, 1753

Origin: A native of Europe

Habitats: Waste places and ballast

Habit: Erect to spreading, annual herbs

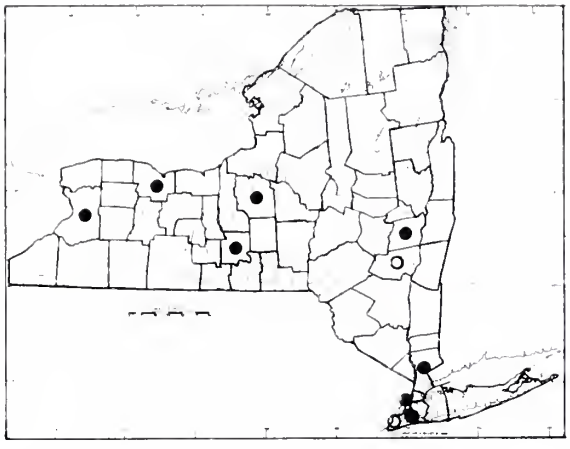
Flowering: July-August

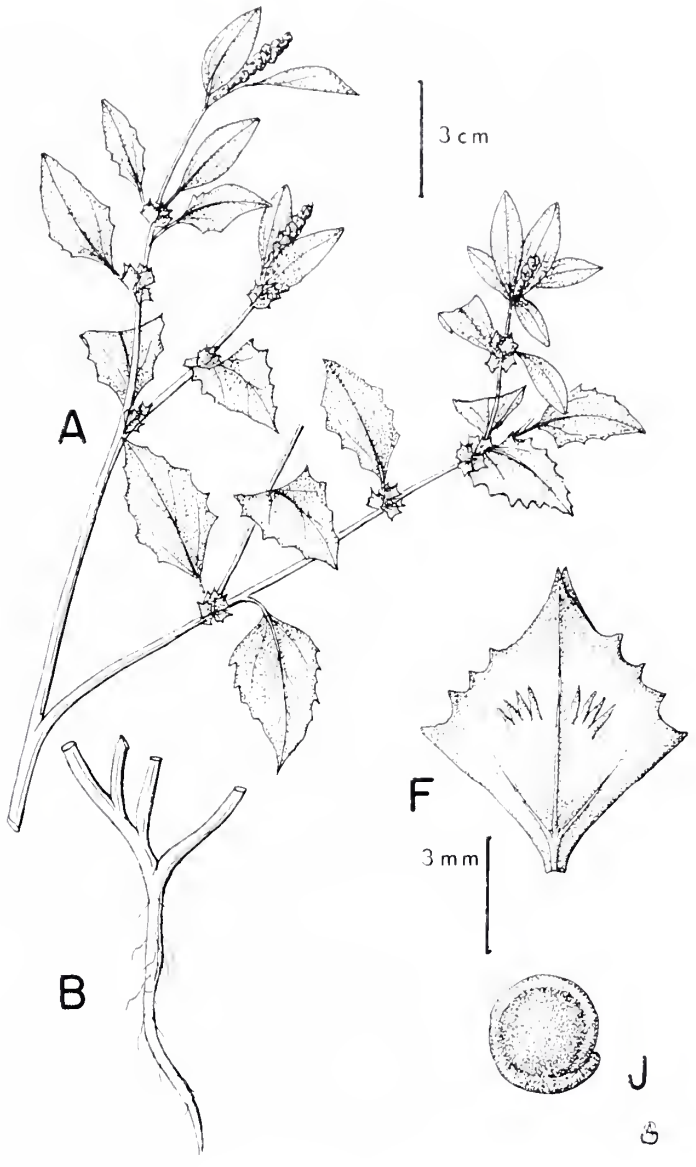
Fruiting: September

General Distribution: Europe, Asia, the East Indies and northern Africa; adventive in North America: Connecticut, New York, New Jersey, Pennsylvania and elsewhere as a ballast waif

Description: Plants **monoecious**; **female flowers:** monomorphic; **stigmas** erect or spreading, 0.6-1.8 mm long; **style** 0.2-0.3 mm long; **ovary** spheroid; **fruit** subrotund, pericarp non-adherent; **seed** brownish, 1.5-2.0 mm in diameter, 0.2-0.3 mm thick, the **radicle** ascending; **perianth** absent; **bracteoles** 2, subsessile, rhombic, 3-7 (-15) mm long, 3.0-4.8 mm broad, not compressed, united to the middle, apex foliaceous, acutely 3-lobed and often denticulate, the sides commonly tuberculate or sometimes smooth; **male flowers: stamens** 5; **filaments** membranaceous, 0.6-0.8 mm long; **anthers** ellipsoid, yellow-orange, 0.3-0.4 mm long; **perianth** 5-lobed, **lobes** scarious, oblong-ovate, 0.5-0.9 mm long, 0.5-0.7 mm broad, apex acute; **bracts** absent; **inflorescences** of glomerules of female flowers in the axils of leaves and in terminal or axillary spikes of either all male flowers or male and female flowers, spikes 2-5 cm long, 2-3 mm broad; **leaves** alternate with kranz-type venation, triangular-rhombic or deltoid usually hastate or subhastate, 2-7 (-10) cm long, 1.0-4.2 (-7) cm broad, apex obtuse to acute, base subtruncate, often hastate, deeply or shallowly sinuate-dentate or rarely undulate, thin, densely whitish-furfuraceous beneath, usually green and glabrate on the upper surface; **petioles** 0.5-1.2 cm long; **stems** erect or ascending, sparsely to densely branched, the branches erect, ascending, or rarely procumbent, 3-15 dm long, slender to stout, obtusely angled, furfuraceous when young, glabrate in age; **root system** an annual taproot (2n = 18).

Importance: This species may be used as a source of potash and was once used in folk medicine.





2. *Atriplex rosea* L.

Common Names: Red Orach, Rosy Orach, Tumbleweed, Tumbling Orach

Type Description: Linnaeus, Species Pl. ed. 2, II, p. 1493, 1763

Synonym: *Atriplex spatiosa* A. Nelson

Origin: Native to the Mediterranean region of Europe

Habitats: Roadsides and a variety of disturbed habitats

Habit: Erect or ascending, annual herbs

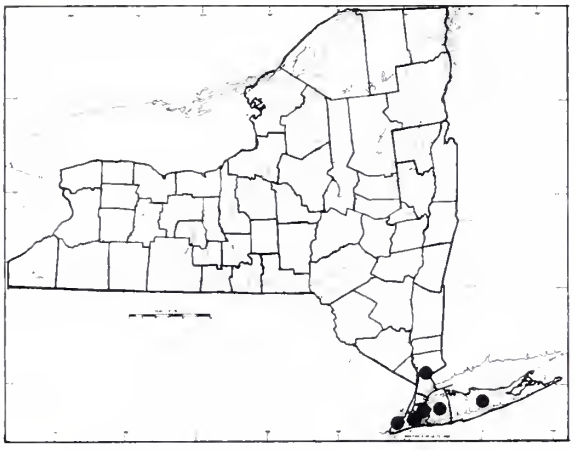
Flowering: July-August

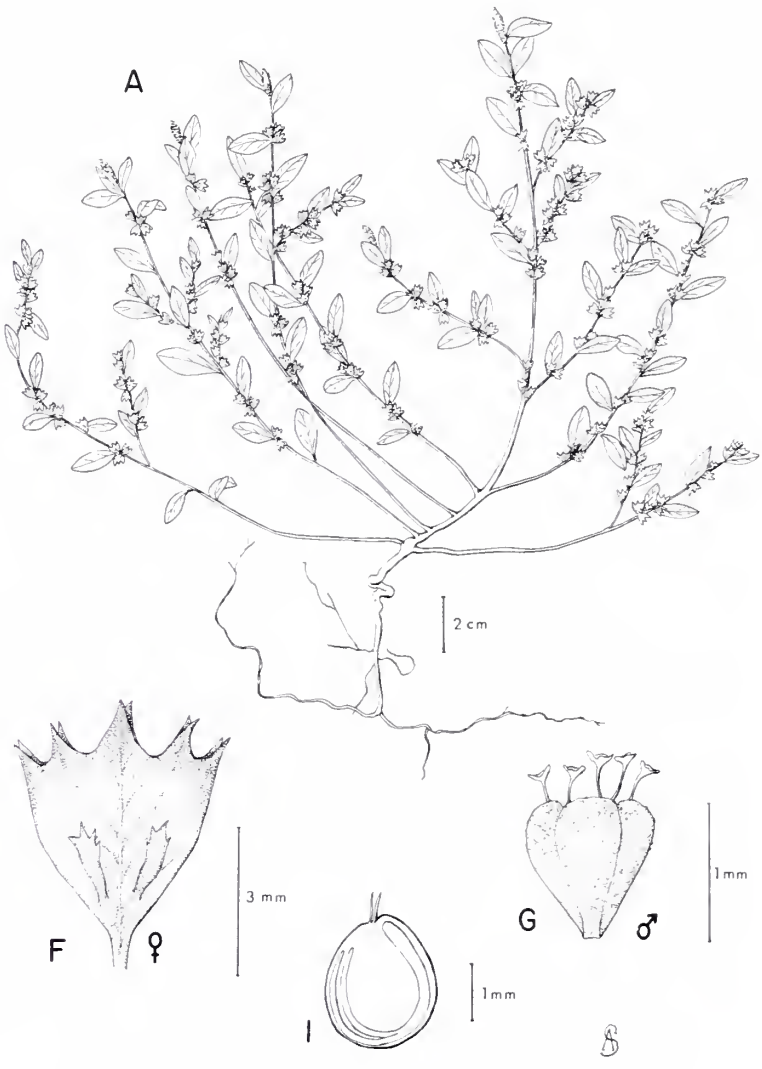
Fruiting: July-October

General Distribution: Mediterranean region, Asia, and Australia; introduced in North America from Nova Scotia to British Columbia south to California and New York

Description: Plants **monoecious**; **female flowers:** monomorphic; **stigmas** erect to spreading, 0.4-0.5 mm long; **style** ca. 0.5 mm long; **ovary** obovoid; **fruit** subrotund, pericarp adherent; **seed** dull brown, subrotund, 2.0-2.3 mm in diameter, 0.6-0.8 mm thick, the **radicle** lateral; **perianth** absent; **bracteoles** 2, subsessile, rhombic or ovate, 3-6 (-12) mm long, 3-6 (-8) mm broad, margin dentate, united to near the middle, the surface usually short-tuberculate, becoming hardened at the base; **male flowers: stamens** 5; **filaments** membranaceous, 0.4-0.7 mm long; **anthers** oblong, yellow-orange, 0.3-0.4 mm long; **perianth** 4-5 lobed; **lobes** scarious, oblong-ovate, 0.3-0.5 mm long, 0.3-0.4 mm broad, apex acute; **inflorescences** of glomerules in the axil of leaves, spikes of sessile glomerules and usually short, interrupted, terminal, staminate spikes; **glomerules** bisexual or all male, subglobose, the bisexual glomerules 2-4 flowered, 0.3-0.9 cm in diameter, the terminal male glomerules globose, 0.2-0.3 cm in diameter; **leaves** alternate except the lowermost, with kranz-type venation, ovate or rhombic-ovate to lanceolate, 1.5-7.5 cm long, 0.7-6.0 cm broad, apex acute to somewhat obtuse, base cuneate or rounded, sinuate-dentate above the base, usually grey to whitish, often becoming hard and persistent with age; **petioles** 0-15 mm long; **stems** erect to ascending, 1-20 dm tall, much-branched, the lateral branches ascending or spreading, terete, mealy or glabrous; **root system** annual with a taproot ($2n = 18$).

Importance: The herbage is used to make potash in Greece and its extract finds limited use in medicine as an antiscorbutic and corrective for scrofula. In the western United States, where the species is widely naturalized, it is said to be the cheapest and most satisfactory hog feed, highly prized for fattening swine. The pollen of this species has also been implicated as a causative factor in hay fever in the western United States.





3. *Atriplex arenaria* Nutt.

Common Names: Seabeach Orach, Seabeach Atriplex

Type Description: Nuttall, Gen. N. Amer. Pl. 1: 198, 1818

Synonyms: *Atriplex cristata* var. *arenaria* (Nutt.) Kuntze, *A. pentandra* ssp. *arenaria* (Nutt.) Hall & Clements, *A. mucronata* Raf., *Obione arenaria* (Nutt.) Moq.

Origin: Native to the North Atlantic Coast of North America

Habitats: Sandy seashores and margins of salt marshes

Habit: Erect to procumbent, annual herbs

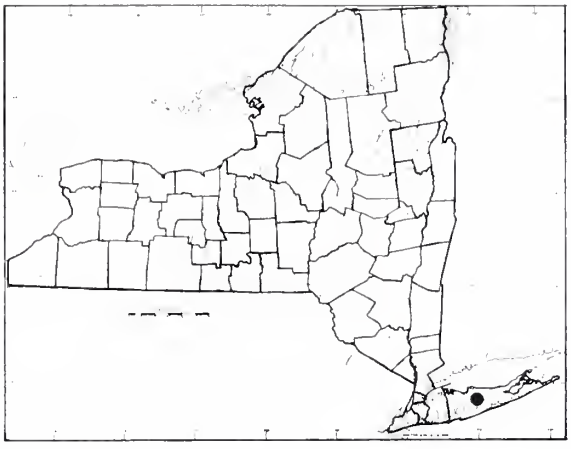
Flowering: August-September

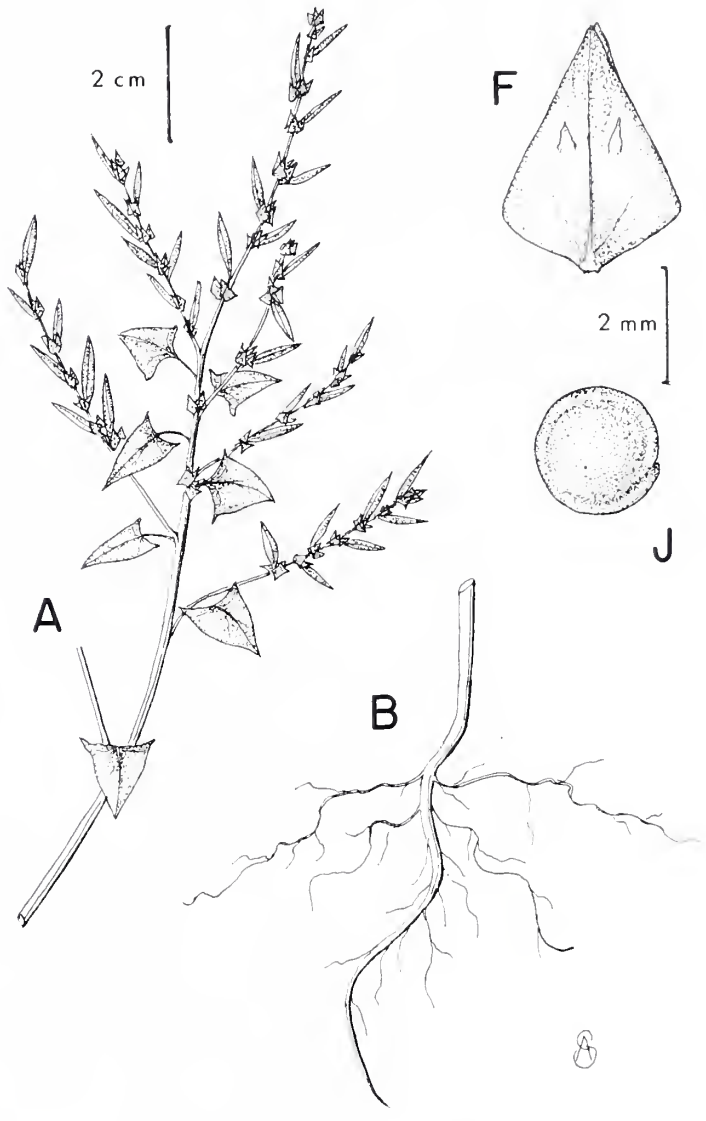
Fruiting: August-December

General Distribution: Along the Atlantic coast from New Hampshire to Virginia

Description: Plants **monoecious**; **female flowers:** monomorphic; **stigmas** erect or spreading, 0.6-1.0 mm long; **style** ca. 0.1 mm long; **ovary** ovoid; **fruit** subrotund, pericarp adherent; **seed** reddish-brown, subrotund, 1.5-2.8 mm in diameter, 0.4-0.5 mm thick, the **radicle** superior; **perianth** absent; **bracteoles** 2, subsessile, obovate to orbicular-obovate, 3.5-7.5 mm long, 4.5-7.5 mm broad, compressed, united to the middle, the apex rounded, sharply dentate above the middle, teeth 3-5, broadly triangular, subequal or the terminal longer than the lateral, bracteole backs with 2 lateral, irregular, dentate crests, or occasionally tuberculate, rarely lacking appendages; **male flowers: stamens** 5; **filaments** membranaceous, 0.4-0.6 mm long; **anthers** ovoid, yellow-orange, 0.3-0.4 mm long; **perianth** 5-lobed; **lobes** scarious, oblong-ovate, 0.4-0.5 mm long, 0.4-0.6 mm broad, apex acute; **female** (and **polygamous**) **inflorescences** of glomerules in the axils of the upper leaves, (usually with some male flowers intermixed); **male inflorescences** terminal spikes, 0.5-3.0 cm long, 2.5-3.5 mm broad, often deciduous from mature plants; **glomerules** bisexual, or male only, subglobose, male glomerules 2-3 mm diameter, mixed glomerules 6-10 mm in diameter; **leaves** alternate, lacking kranz-type venation, oblong, oval, broadly obovate or narrowly oblong, 1.2-4.0 cm long, 0.4-1.5 cm broad, rounded to acute at the apex, mucronate, rounded to cuneate at the base, entire or undulate, rarely with 1-2 teeth, thin, densely whitish-furfuraceous beneath, grayish green or glabrate above; **petioles** 0-2 mm long; **stems** erect, ascending or procumbent, much-branched, lateral branches procumbent, 1-5 dm long; annual with a branched **root system**.

Infraspecific Variation: This species is closely related to a native of the southeastern U.S. coast, *A. pentandra* (Jacq.) Standl., and has been treated as a subspecies by Hall & Clements (1923).





4. ***Atriplex glabriuscula*** **Edmondston**

Common Name: Seaside Orach

Type Description: Edmondston, Fl. Shetland, p. 39, 1845

Synonyms: *Atriplex glabriuscula* var. *oblanceolata* Victorin & Rousseau, *A. patula* ssp. *glabriuscula* (Edmondston) H. M. Hall & Clements, *A. patula* var. *oblanceolata* (Victorin & Rousseau) Boivín

Origin: Native to the Northern Atlantic coasts of Europe and North America

Habitats: Coastal sands and salt marshes

Habit: Erect, procumbent or prostrate perennial herbs

Flowering: August

Fruiting: September

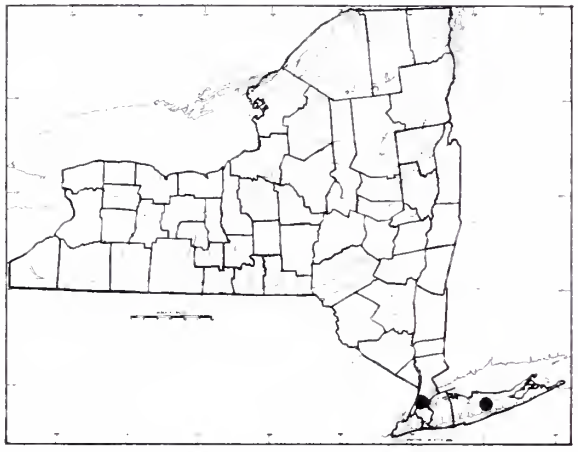
General Distribution: Northwestern Europe and Iceland, and in North America from Greenland to the Northwest Territories south to New England and New York

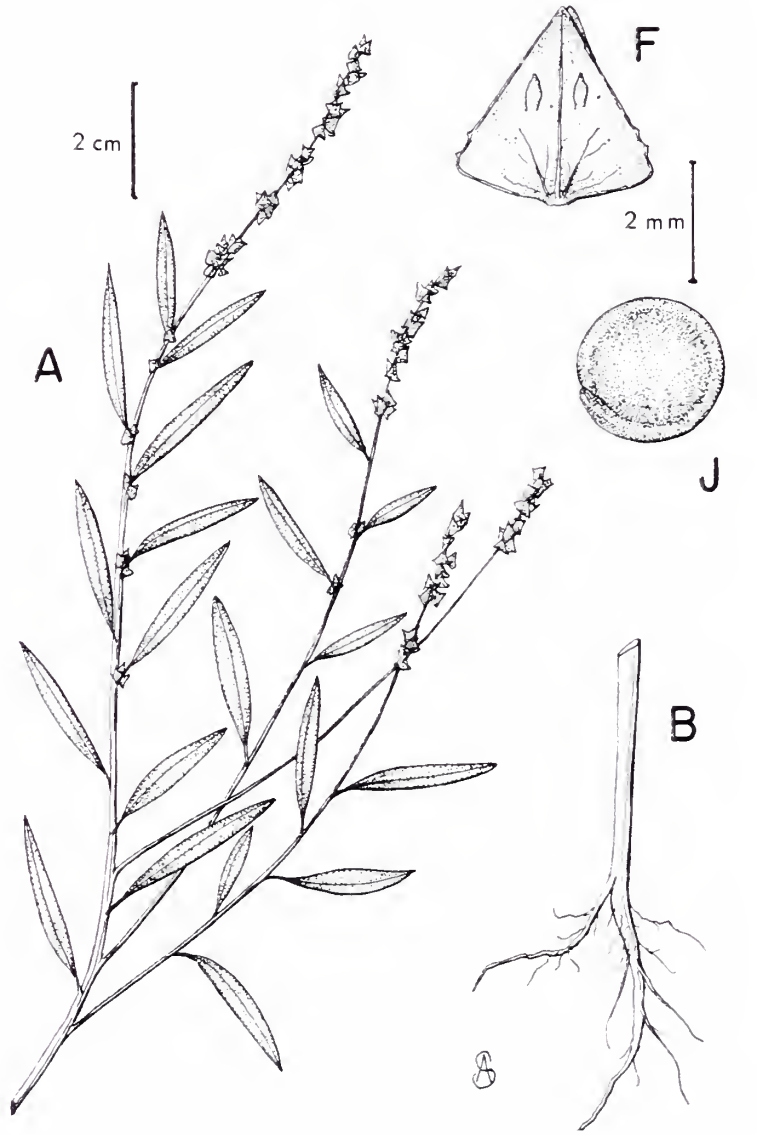
Rarity Status: This species is ranked G4 SH by the New York Natural Heritage Program

Description: Plants **monoecious**; **female flowers:** monomorphic; **stigmas** erect or spreading, 0.4-0.5 mm long; **style** 0-0.1 mm long; **ovary** ovoid; **fruit** spherical to oval, pericarp adherent; **seeds** dimorphic (with some intermediates): brown or black, brown seeds oval or rounded, 2-3 mm in diameter, 0.2-0.4 mm thick, with the **radicle** subbasal to median, obliquely pointing outward, the apex blunt, black seeds spheroid to oval, 1.1-1.4 mm in diameter, 0.2-0.4 mm thick, the **radical** subbasal; **perianth** absent; **bracteoles** 2, often with a foot-stalk when arising from leaf axil, triangular-hastate, 3-5 (-11) mm long, 2.7-4.0 mm broad, green, often reddish becoming brown to black with maturity, apex acute to acuminate, base truncate to subcordate or obtuse, margins united at the base, denticulate to laciniate, dorsal surface smooth convex, rarely with two small tubercles, spongy inner layer strongly or weakly developed; **male flowers: stamens** 5; **filaments** membranaceous, ca. 0.6 mm long; **anthers** ellipsoid, yellow-orange, ca. 0.4 mm long; **perianth** 5-lobed; **lobes** scarious, oblong-ovate, ca. 0.5 mm long, ca. 0.5 mm broad, apex acute; **bracts** lanceolate, 0.4-1.1 cm long, 0.2-0.6 cm broad; **inflorescences** single flowers or glomerules in the axil of reduced upper leaves, the uppermost clusters occasionally without bracts and therefore forming a terminal spike; **glomerules** bisexual, subglobose, 2-5 flowered, 3-4 mm in diameter; **leaves** alternate, lacking kranz-type venation, lower leaves: triangular-hastate with a pair of broad-based up-curving acute lobes pointing outward, 4-8 cm long, 0.4-1.5 cm broad, apex acute, base truncate, irregularly serrate to sinuate-dentate above the lobes, glabrous or finely farinose, upper leaves: lance-hastate with a pair of out-pointing to up-curving basal lobes or lanceolate and lacking lobes, smaller than lower leaves, sessile to subsessile; **petioles** on lower leaves 1.5-2.5 mm

long, upper leaves sessile or subsessile; **stems** prostrate, decumbent or erect, few branched, branches asymmetric, the lowermost wide-spreading and the first 3-6 (-8) pairs opposite, becoming alternate above, stems subangular, green, often red-striped, becoming tough-woody toward the base, straight, 0.5-1.7 dm long; **root system** annual with a taproot (2n = 18).

Infraspecific Variation: The seeds are dimorphic, but brown, convex intermediate seeds are relatively common, and both seed types are often slightly wider than long.





5. *Atriplex subspicata* (Nutt.) Rydberg

Common Name: Orach

Type Description: Nuttall, Gen. N. Amer. Pl. 1: 199, 1818

Synonyms: *Atriplex carnosa* Nelson, *A. lapathifolia* Rydberg, *A. patula* var. *subspicata* (Nutt.) S. Watson, *Chenopodium subspicatum* Nutt.

Origin: Native to North America

Habitats: Saline and alkaline soils in waste places

Habit: Erect annual herbs

Flowering: July-September

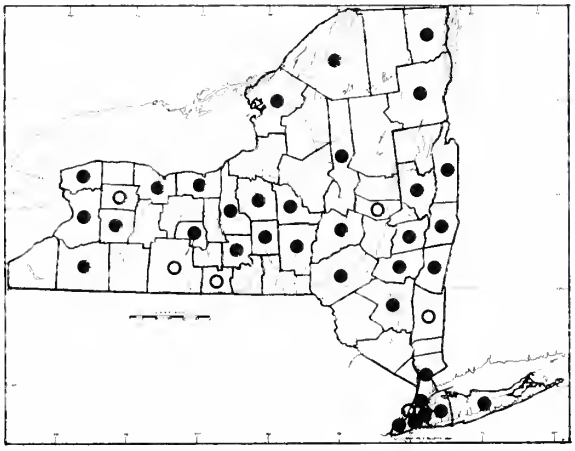
Fruiting: August-November

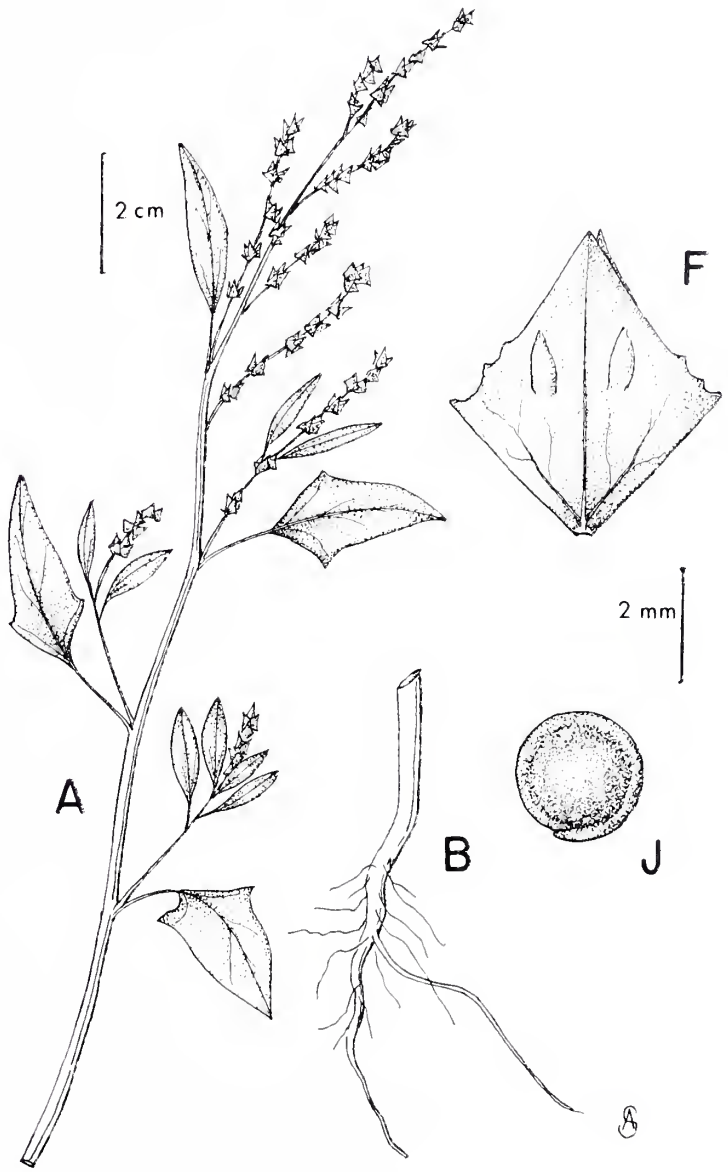
General Distribution: Newfoundland to British Columbia south to California, Utah, Oklahoma and North Carolina

Rarity Status: *Atriplex subspicata* is ranked G5 SH by the New York Natural Heritage Program.

Description: Plants **monoecious**; **female flowers:** monomorphic; **stigmas** erect or spreading, 0.2-0.3 mm long; **style** absent; **ovary** ovoid; **fruit** depressed ellipsoid, pericarp adherent; **seeds** dimorphic: brown or black, the brown seeds depressed ellipsoid, (1.5-) 2.1-2.6 mm long, 2.4-3.0 mm broad, ca. 0.7 mm thick, the **radicle** generally median ascending with apex abruptly incurved, the black seeds depressed-ellipsoid, (1.4-) 2.5-3.1 mm long, (1.7-) 2.8-3.4 mm broad, ca. 0.7 mm thick, convex, rounded, the **radicle** generally basal, with the apex incurved; **perianth** absent; **bracteoles** 2, sessile, thick, green, blackening with maturity, broadly triangular to ovate triangular, 3.0-5.4 mm long, 4.2-4.5 mm broad, usually longer than wide, margins entire or occasionally with sharp teeth, dorsal surface with one or more tubercles with an inflated inner spongy layer, the surface rarely smooth; **male flowers:** not seen in New York material; **bracts** absent or leaf-like; **inflorescences** terminal and axillary spikes or with a few leafy bracts toward the base, spikes 5-10 cm long; **glomerules** bisexual, subglobose to irregularly globular, 0.8-1.0 mm in diameter; **leaves** alternate, lacking kranz-type venation, lanceolate to narrowly lanceolate or linear, rarely ovate to oblong, often with a

pair of outwardly pointing to forward-curving obtuse lobes, 2.5-4.0 (-12) cm long, 0.2-6.0 cm broad, apex acuminate, base cuneate, margins irregularly broad-toothed or entire, green to grayish green, often reddish at or toward maturity, succulent; **petioles** 1-3 cm long, **stems** erect or occasionally semierect, 3-15 dm tall, branches 1-many, alternate except for the 2-3 lowermost opposite pairs, stems angular, with light green to green or occasionally red to reddish stripes; **root system** annual with a taproot (2n = 36, 54).





6. *Atriplex patula* L.

Common Names: Seaside Orach, Seaside Atriplex, Spearscale

Type Description: Linnaeus, Species Pl. II, p. 1053, 1753

Synonyms: *Atriplex angustifolia sensu* Smith, *A. patula* var. *bracteata* of authors, not Westerlund, *A. patula* var. *littoralis* A. Gray

Origin: Circumboreal in distribution

Habitats: Saline and brackish areas near the coast; edges of sidewalks, lawns, roads, margins of beaches and other disturbed areas

Habit: Erect to prostrate, annual herbs

Flowering: July-September

Fruiting: August-October

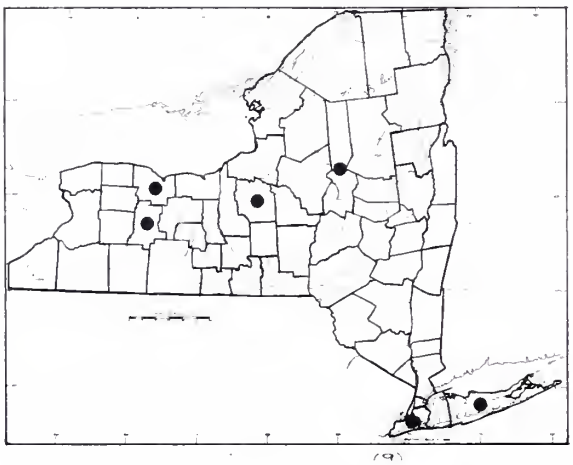
General Distribution: Eurasia; in North America, widely distributed from Newfoundland to British Columbia south to Missouri, Illinois and North Carolina

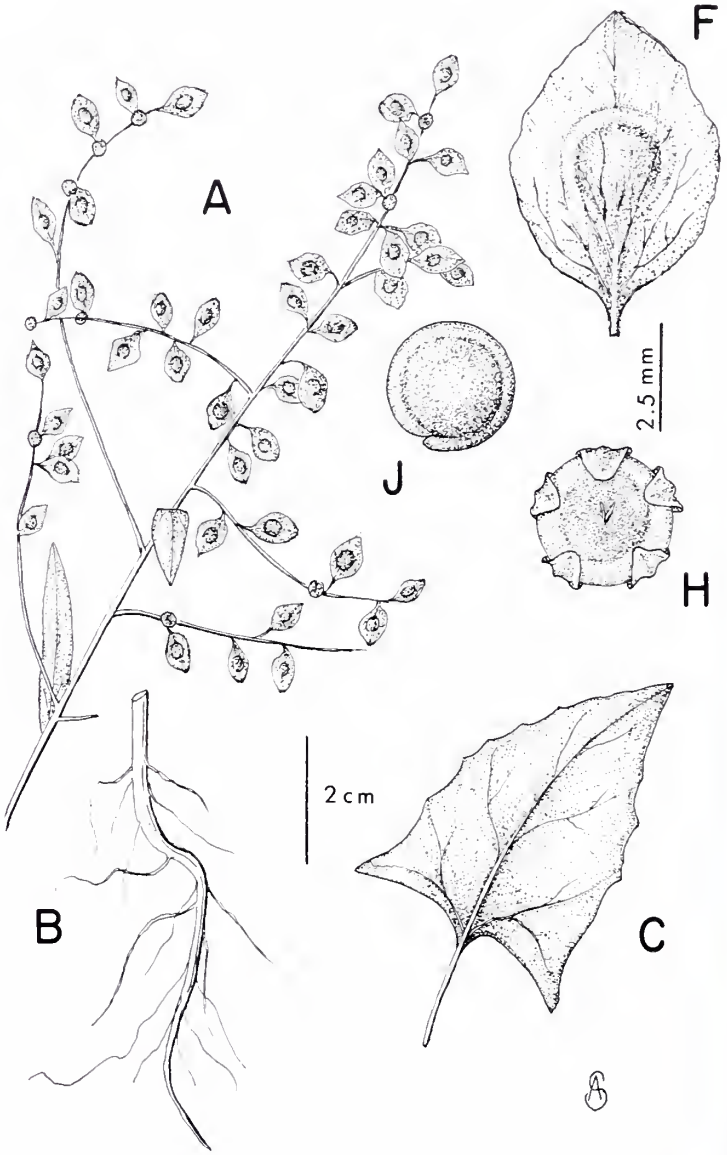
Description: Plants **monoecious**; **female flowers:** monomorphic: **stigmas** spreading, 0.4-0.6 mm long: **style** absent; **ovary** ovoid; **fruit** oval or orbicular, pericarp adherent; **seeds** dimorphic; brown and black, the brown seeds orbicular, 2-3 (-3.5) mm in diameter, 0.8-1.0 mm thick, the **radicle** inferior, subbasal, the ascending apex pointed, black seeds oval, 1.6-2.0 mm in diameter, 0.6-0.8 mm thick, often wider above the radicle, the **radical** basal, pointing outward; **perianth** absent; **bracteoles** 2, subsessile, rhombic-triangular to triangular-hastate, 3-6 (-20) mm long, 2.5-5.0 mm broad, green becoming blackened at maturity, united almost to the middle, apex acute to acuminate, base cuneate to broadly obtuse, with lateral angles prominent and usually strongly developed, entire or with 1 or 2 teeth at the lateral angles, dorsal surface smooth or with irregular, laciniate appendages, foliaceous, thin, lacking a spongy inner layer, venation obscure or the midvein alone prominent; **male flowers: stamens** 5; **filaments** membranaceous, ca. 0.6 mm long; **anthers** ovoid, yellow-orange, 0.4-0.5 mm long; **perianth** 5-lobed; **lobes** scarious, oblong-

ovate, 0.5-0.7 mm long, 0.4-0.5 mm broad, apex acute; **bracts** absent; **inflorescences** terminal and axillary, flexuous spikes 3-12 cm long, formed from widely spaced sessile glomerules, the lower glomerules in the axil of reduced leaves the upper bractless; **glomerules** bisexual, subglobose, 5-15 flowered, 0.3-1.0 cm in diameter; **leaves** alternate, lacking kranz-type venation, oblong, oval, broadly obovate or narrowly oblong, 1.2-7.0 (-14) cm long, 0.4-4.0 (-6) cm wide, rounded to acute at the apex, mucronate, rounded to cuneate at the base, entire, undulate, or undulate-dentate, rarely with 1-2 teeth, or 1-2 lobes, outward or apically pointing, thin, densely whitish-furfuraceous beneath, grayish green or glabrate above; **petioles** 0.4-1.3 cm long; **stems** erect, ascending or procumbent, strongly ridged, much-branched, branches 1-5 dm long; **root system** annual with a branched taproot and fibrous lateral roots (2n = 36).

Taxonomic Note: This species and *A. prostrata* are often confused or treated as varieties of a single species. In fruit, the two species are easily distinguished, in that *A. patula* has narrow, rhomboid to triangular bracteoles without much of a spongy layer. The leaves are cuneate at the base, often with two lobes pointing toward to apex. Much of the difficulty in identification has been attributed to hybridization, but I have found very few putative hybrids between these two species.

Importance: Extracts from plants of this species have occasionally been used in folk medicine to cure headaches, "wandering pains" and rheumatism.





7. *Atriplex hortensis* L.

Common Names: Garden Orach, Mountain Spinach, Garden Atriplex, Garden Scale, Butter-leaves, Wild Beet

Type Description: Linnaeus, Species Pl. II, p. 1053, 1753

Synonyms: *Atriplex nitens* Schkuhr, *A. sagittata* Borkhausen

Origin: A native of Asia (Tartary)

Habitats: Weedy areas and disturbed ground, especially around gardens

Habit: Erect, annual herb

Flowering: August

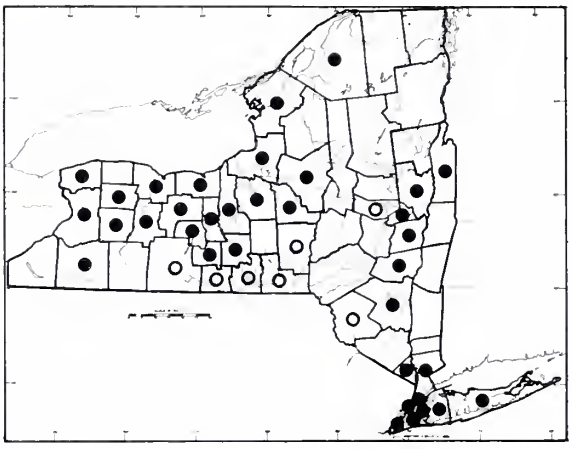
Fruiting: August-October

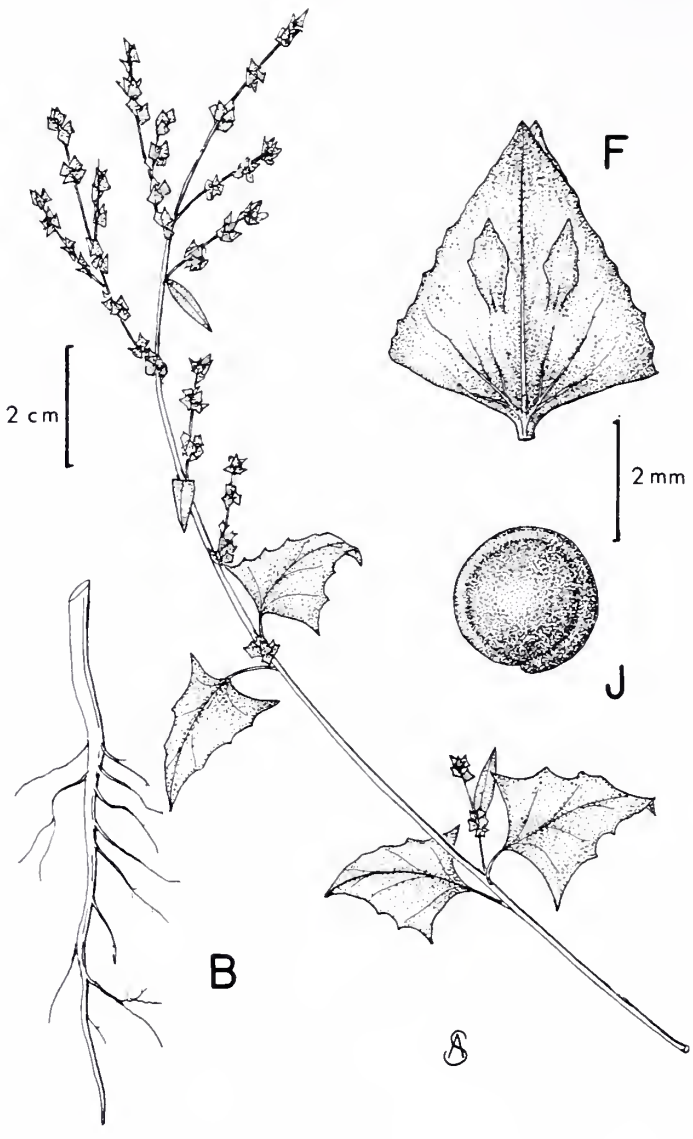
Distribution: Asia, and naturalized throughout central and southern Europe; in North America from Quebec to Alaska south to Utah, Illinois and New Jersey (Cuba)

Description: Plants **monoecious**; **female flowers**: dimorphic, some lacking bracteoles, but with a 5-parted perianth, most flowers with 2 bracteoles, but lacking a perianth; **stigmas** erect or spreading, ca. 0.2 mm long; **style** ca. 0.1 mm long or absent; **ovary** ovoid; **fruit** oval or depressed-ovoid, the pericarp non-adherent; **seeds** trimorphic: perianth-bearing flowers with horizontal, biconvex, black seeds, oval, 1.4-1.6 (-2) mm in diameter, 0.4-0.8 mm thick, bracteolate flowers bearing 2 seed-types: vertical, black or yellowish-brown seeds, the black seeds, flat, oval, 1.8-2.0 (-4) mm in diameter, 0.4-0.8 mm thick, yellowish-brown seeds oval, 1.2-1.4 mm in diameter, 0.3-0.6 mm thick, **radicle** vertical; **perianth** 3-5 lobed on flowers without enlarged bracteoles (absent from flowers with enlarged bracteoles); **perianth lobes** scarious, oblong, 0.5-0.7 mm long, ca. 0.2 mm broad, apex obtuse; **bracteoles** orbicular, the size variable, from 4-10 mm long and 3-7 mm broad, larger in cultivated specimens, united at the base, veined; **male flowers: stamens** 5; **filaments** membranaceous, 0.3-0.4 mm long; **anthers** ellipsoid, orange, 0.2-0.3 mm long; **perianth** 5-lobed; **lobes** oblong, 0.5-0.7 mm long, 0.4-0.5 mm broad, apex obtuse; **bracts** absent; **inflorescences** terminal and axillary, slender spikes mostly 2-8 cm long, the terminal spikes usually arranged in a panicle; **glomerules** bisexual or occasionally only staminate, 2-8 flowered; **leaves** alternate, lacking kranz-type venation, triangular or ovate-triangular, hastate, 4-12 (-20) cm long, 1-7 cm broad, apex acute or obtuse, base rounded, truncate, or subcordate, margin entire or irregularly dentate, mealy, becoming glabrous and green; **petioles** 0.5-3.0 cm long; **stems** erect or half-decumbent, widely branched from the base, (5-) 15-25 (-30) dm tall; **root system** annual with a taproot (2n = 18).

Infraspecific Variation: The plants that escape from cultivation within our range appear to be the same as Eurasian *A. hortensis* ssp. *nitens* (Schkuhr) Pons., with scurfy lower leaf surfaces and ovate-cordate bracteoles. But, as Hall and Clements (1923) have pointed out, these characters do not seem to be adequate for separating many specimens from typical *A. hortensis*. Several authors have suggested that the cultivated *A. hortensis* is derived through selection from *A. hortensis* ssp. *nitens*, and it appears that the escaped and naturalized plants may be reverting back to their ancestral phenotypes.

Importance: Garden Orach has been used as a kitchen vegetable since antiquity. The Greeks and Romans used it much like Spinach, boiling the leaves. Although it is considered inferior to Spinach, it is still used in greens mixtures to a limited extent, especially, to correct the acidity and color of sorrel (*Oxalis*). The leaves are high in Vitamin C content. A red color-variant (var. *atrosanguinea* Hort.) is sometimes grown as an ornamental herb. The seeds are used in the Russia and the Baltic nations to produce a blue dye; the plants were once crushed and mixed with wine as a reputed cure for yellow jaundice.





8. *Atriplex prostrata* Boucher ex DC. in Lam. & DC.

Common Names: Orach, Spearscale

Type Description: Boucher ex DeCandolle in Lamarck & DeCandolle, Fl. Franç, p. 387, 1805

Synonyms: *Atriplex deltoides* Babington, *A. hastata sensu* Aellen, not L., *A. oppositifolia* DC., *A. triangularis* Willd.

Origin: Of uncertain origin; very widespread and perhaps native to northern Europe

Habitats: Saline and brackish soils near the coast; waste places, occasionally in cultivated fields inland

Habit: Erect, decumbent or procumbent, annual herbs

Flowering: August-September

Fruiting: September

General Distribution: Europe, Asia and North Africa; in North America from Nova Scotia west to British Columbia south to Illinois Missouri and South Carolina

Description: Plants **monoecious**; **female flowers:** monomorphic; **stigmas** erect or spreading, 0.2-0.3 mm long; **style** absent; **ovary** ovoid; **fruit** oval, pericarp adherent; **seeds** dimorphic: brown and black, the brown seeds oval, (1.5-) 2.1-2.5 mm in diameter, 0.5-0.6 mm thick, the **radicle** subbasal, subascending or out-pointing with a blunt, not free apex, black seeds oval, (1-) 1.3-1.8 mm in diameter, 0.4-0.5 mm thick, the **radical** basal, out-pointing; **perianth** absent; **bracteoles** subsessile, triangular-hastate to triangular-ovate or broadly ovate, 1.4-5.2 mm long, 2-5 mm broad, green becoming brown to black at maturity, margins united at the base, apex broadly to moderately acute, the base truncate to obtuse with the lateral angles rounded, entire or with a pair of short teeth at the apex and sometimes at the lateral angles, the dorsal surface smooth or with 2 (often muricate) tubercles, foliaceous or more or less inflated, a spongy inner layer present, but usually weakly developed, venation obscure or prominent; **male flowers: stamens** 5; **filaments** membranaceous, 0.2-0.4 mm long; **anthers** ellipsoid, yellow-orange, 0.2-0.3 mm long; **perianth** 5-lobed; **lobes** scarious, oblong-ovate, 0.3-0.4 mm long, 0.3-0.5 mm broad, apex acute; **bracts** absent or lanceolate, up to 3 cm long and 1 cm broad; **inflorescences** terminal and axillary spikes, occasionally with leafy bracts at the base, 2-20 cm long, composed of well-spaced glomerules; **glomerules** bisexual, or the terminal ones wholly staminate, irregularly globose, 6-8 flowered, 0.3-1.2 cm in diameter; **leaves** alternate, lacking kranz-type venation, the lower leaves triangular-hastate with a pair of wide-based, obtuse lobes pointing outward, 2-9 cm long, 2-7 cm broad, the apex acute to obtuse or rounded, mucronate, base cordate, truncate or rarely somewhat obtuse, often with a pair of simple or compound teeth toward the outer margin, entire, broadly serrate, dentate or irregularly toothed, green or reddish, the upper leaves smaller and less toothed (or hastate); **petioles** 1-3 (-4) cm long;

stems erect, decumbent or procumbent, subangular to angular, green or green-and stramineous-striped, reddish or not, 1-10 dm tall, little-branched to much-branched, the branches opposite or subopposite, ascending to procumbent, 1-5 dm long; **root system** annual with a taproot.

Note: A species often confused with *A. patula*; however, the broad, truncate leaf bases and broadly ovate bracteoles with spongy layers are distinctive characters of this taxon.

Importance: The seeds of *Atriplex patula* were used much like those of Garden Orach, and were said to cure yellow jaundice. The leaves have, occasionally, been eaten as a potherb.

Waifs: *Atriplex argentea* Nutt. and *A. serenana* A. Nels. were both collected once in Tompkins county on a newly seeded lawn. *Atriplex laciniata* L. has been reported from New York City but no specimens have been seen.

3. SPINACIA

Common Name: Spinach

Authority: Linnaeus, Species Pl. II, p. 1027, 1753

A genus of 3 species, from southwest Asia.

Waif: *Spinacia oleracea* L., garden spinach, has been collected in Albany, Madison, Monroe, New York, Suffolk, Tompkins & Yates Counties as a non-persistent escape from cultivation.

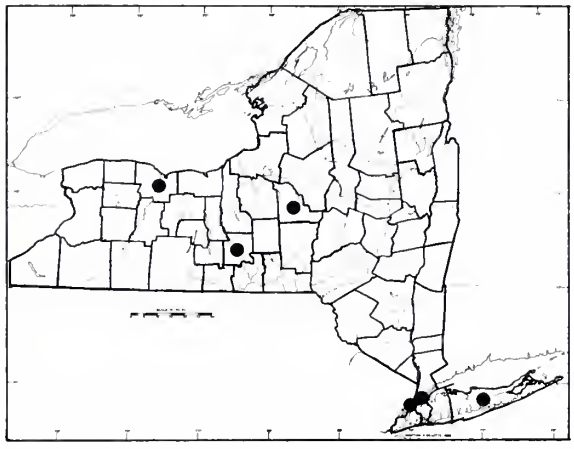
Importance: Spinach has long been cultivated for its succulent, edible leaves. The leaves are rich in Vitamins A, B, C and chlorophyll, and their high iron content has caused them to be recommended for persons suffering from anemia.

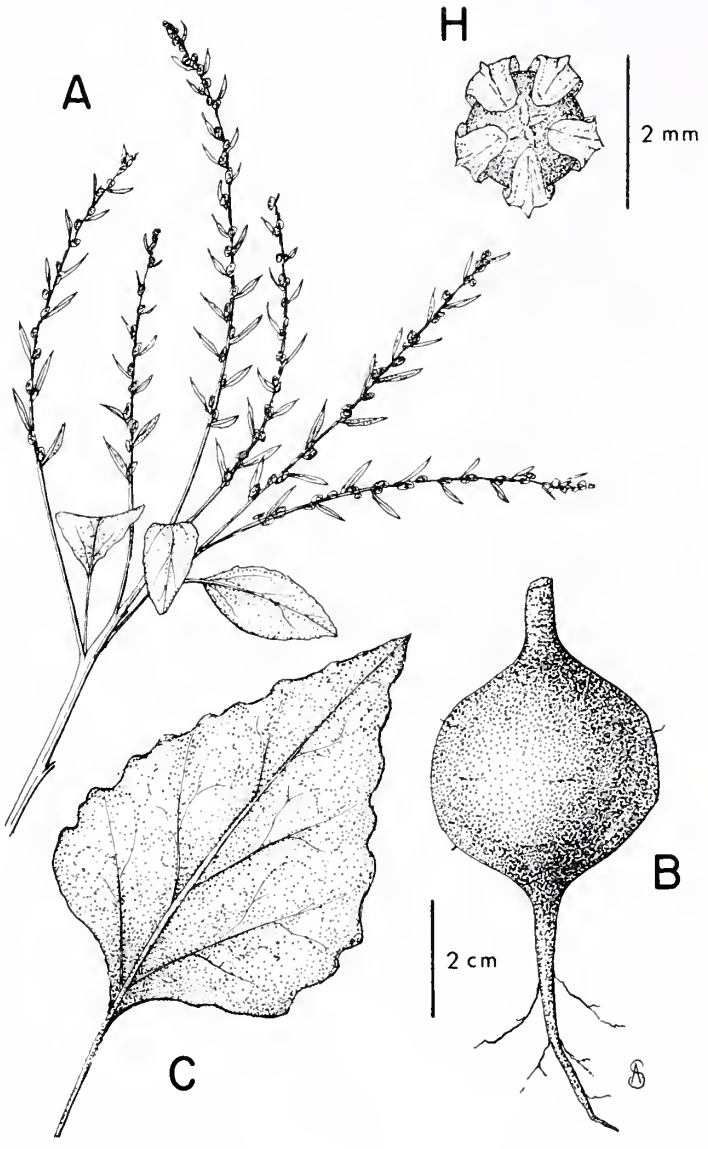
4. BETA

Common Name: Beet

Authority: Linnaeus, Species Pl. I, p. 222, 1753

A genus of 6-12 species, native to the Mediterranean Region. Cultivated varieties of the garden beet escape, and plants of the wild-growing, European subspecies have been reported in North America as ballast waifs.





1. *Beta vulgaris* L.

Common Names: Garden Beet, Beetroot, Mangel Wurzel, Swiss Chard, (Seaside Beet)

Type Description: Linnaeus, Species Pl. I, p. 222, 1753

Origin: A native of Europe

Habitats: Waste places, especially in coastal areas and around vegetable gardens

Habit: Erect or prostrate, annual herbs

Flowering: August

Fruiting: September

General Distribution: Coastal Europe; in North America widely scattered but hardly naturalized, occurring as a garden escape or waif, especially in coastal areas from New York to British Columbia

Description: Plants with **bisexual** flowers; **stigmas** 2-3, oblong to triangular, spreading, 0.6-0.7 mm long; **style** absent; **ovary** 1, partially inferior, depressed obovoid, unilocular, with a single basal **ovule**; **fruit** an indehiscent utricle, depressed-ovoid, the pericarp attached to the perianth below, above fleshy or indurate, non-adherent, 0.7-1.6 mm long, 1.3-2.5 mm broad; **seed** 1, homomorphic, horizontal, black, orbicular to reniform, 1.5-2.0 mm in diameter, 1.2-1.5 mm thick, testa smooth, glabrous; **embryo** annular; **perisperm** copious; **radicle** centrifugal; **stamens** 5, perigynous; **filaments** linear, membranaceous, 0.9-1.0 mm long; **anthers** tetrasporangiate, globose, yellow, 0.5-0.6 mm long; **perianth** 5-lobed, urceolate; **lobes** adherent to the base of the ovary and to others of the same glomerules, herbaceous to coriaceous, oblong, becoming linear, 0.9-1.3 mm long, 0.5-0.9 mm broad, apex obtuse, strongly carinate forming a hood; **bracts** linear to linear-lanceolate, 1.0-1.3 cm long, 0.5-5 mm broad, often absent from the upper part of the inflorescence; **pedicels** very short, the flowers forming glomerules; **bracteoles** absent; **inflorescence** terminal, of simple or paniculate spikes and axillary glomerules, in dense spikes at first, these becoming much-elongated and interrupted in fruit; **glomerules** 1-8 flowered, sessile, the flowers often connivent in fruit due to the swollen perianth and receptacle; **leaves** simple, alternate and basal, herbaceous, basal leaves oval or ovate-oblong, 13-18 (-70) cm long, 4-15 cm broad, apex rounded or obtuse, the base subcordate and abruptly decurrent, entire or subsinuate, often undulate, fleshy, green to dark red or purple, the blades of the cauline leaves broadly ovate to lanceolate, acute to acuminate; **petioles** of basal leaves often as long as the blades, the cauline leaves subsessile; **stems** herbaceous, 6-12 (-20) dm tall, 1-several from each root, erect or procumbent, usually glabrous throughout; **root system** annual or biennial (perennial), branched and somewhat woody, showing rings of growth in cross-section, the cultivated beets developing a swollen taproot, conic to broadly depressed-fusiform, white, or often with yellow to dark red-purple pigmentation, up to 15 (-35) cm long and 18 cm in diameter (2n = 18).

Infraspecific Variation: Two subspecies have been collected in New York State. *Beta vulgaris* ssp. *vulgaris* (the garden beet) has an unbranched greatly swollen root that is often top-shaped, erect stems and glomerules with 1-8 flowers that cling together. *Beta vulgaris* ssp. *maritima* (L.) Arcang. usually has a branched, non-swollen root, procumbent stems and glomerules of mostly 1-2 flowers that are not strongly coherent.

Importance: *Beta vulgaris* is unique among cultivated plants. It has been brought into cultivation four separate times for four different uses. The most common cultivar is the garden beet, the root of which is usually boiled or pickled. The red-purple juice is a notoriously difficult stain to remove from clothing, and it has been used as a dye for both food and apparel. Swiss chard has been selected for its leaves that are edible as salad greens or boiled like spinach. The foliage of most beets is very high in calcium oxalate content and can numb the palate or even result in oxalate poisoning if too much of the substance is ingested. The sugar beet has been selected for its high sucrose content, and it serves as a major source of refined sugar. Cultivated forms often have up to 13 percent sugar. The crop called Mangels Wurtzel has been selected for roots that are high in nutritive value, making them ideal for use as livestock fodder. There are also a number of cultivars of beet and chard that are grown for their colorful foliage.

5. SALSOLA

Common Names: Russian Thistle, Salsola, Tumbleweed

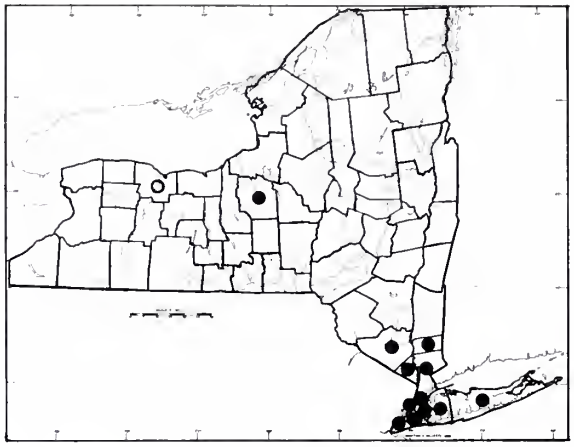
Authority: Linnaeus, Species Pl. I, p. 222, 1753

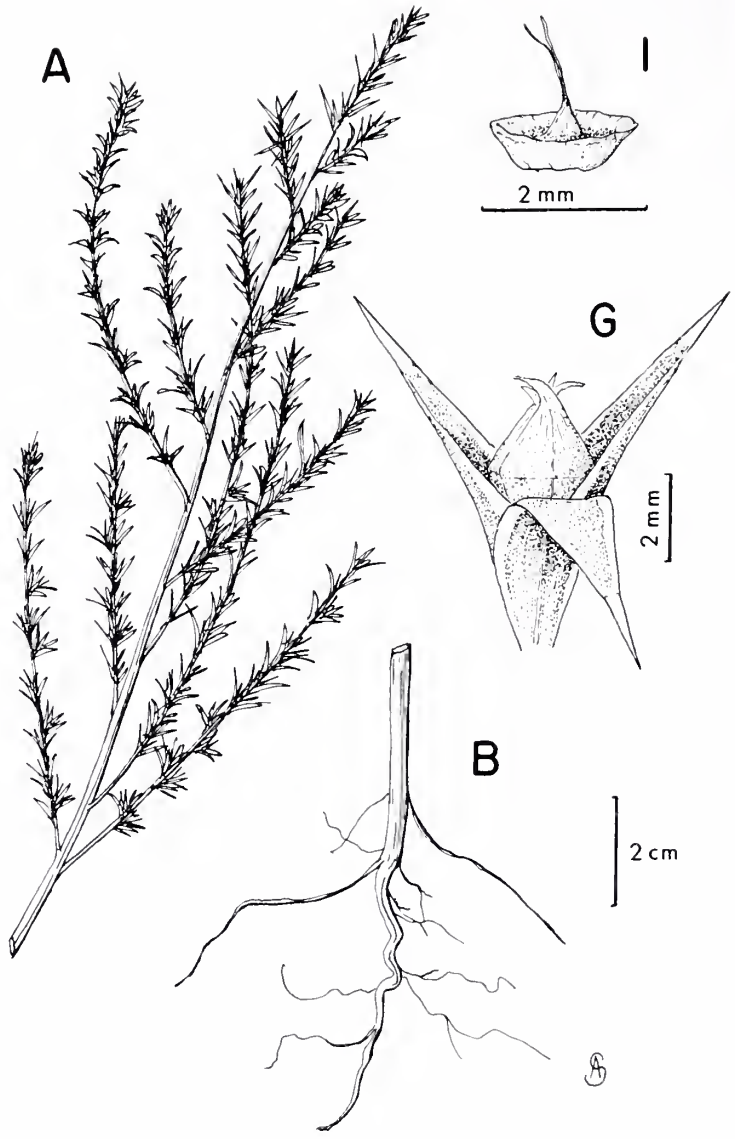
A genus of 120-150 species; cosmopolitan but most diverse in the Asia. *Salsola* grows mostly along sea-coasts and in other saline or alkaline habitats. Many species have been used for extracting potash.

Description: Plants with **bisexual** flowers; **stigmas** 2 (-3), subulate; **style** 1 or absent; **ovary** 1, superior, unilocular with a single, basal **ovule**; **fruit** a dehiscent or indehiscent utricle, included in the perianth, the pericarp fleshy or membranaceous, non-adherent; **seed** 1, horizontal, rarely inverted, erect or oblique; **embryo** spiral or cochleate-spiral; **perisperm** absent; **radicle** centrifugal; **stamens** 5 or fewer, hypogynous or rarely inserted on a minute disk; **filaments** linear; **anthers** tetrasporangiate; **perianth** deeply 5-lobed (rarely 4-lobed), incurved over the fruit at maturity, the tips connivent and erect, transversely carinate or winged; **bract** narrowly triangular, the apex spinose; **pedicels** very short, the flowers subsessile; **bracteoles** 2, narrowly triangular, apex spinose; **inflorescences** are terminal spikes with solitary flowers, or fascicles in the axils of leaf-like bracts; **leaves** simple, usually alternate, succulent, sessile or clasping; **petioles** absent; **stems** herbaceous or woody, glabrous or pubescent; **root system** an annual taproot or perennial stalk.

KEY TO SPECIES

1. Sepals stiff, somewhat spinose, with a distinct mid-vein and a very small or absent wing; plants usually hispid; early leaves linear to lanceolate .....1.*S. kali*
1. Sepals soft with an obscure midvein and prominent, broad wings; plants often glabrous; early leaves long, linear, filamentous .....2. *S. pestifer*





1. *Salsola kali* L.

Common Names: Russian Thistle, Salsola, Barilla

Type Description: Linnaeus, Species Pl. I, p. 222, 1753

Synonym: *Salsola kali* var. *caroliniana* (Walt.) Nutt.

Origin: Native to Eurasia

Habitats: Sea beaches and in sandy soil near the coast

Habit: Erect, annual herb

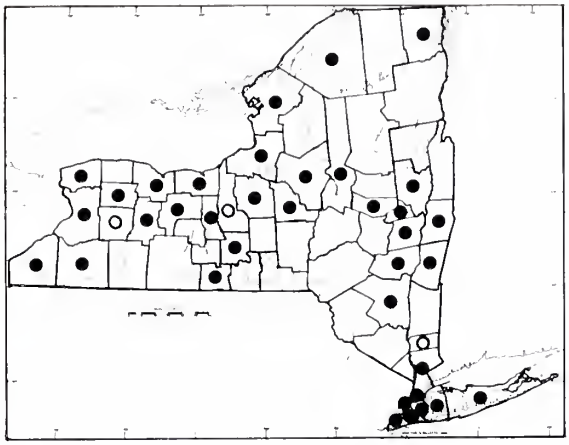
Flowering: July-September

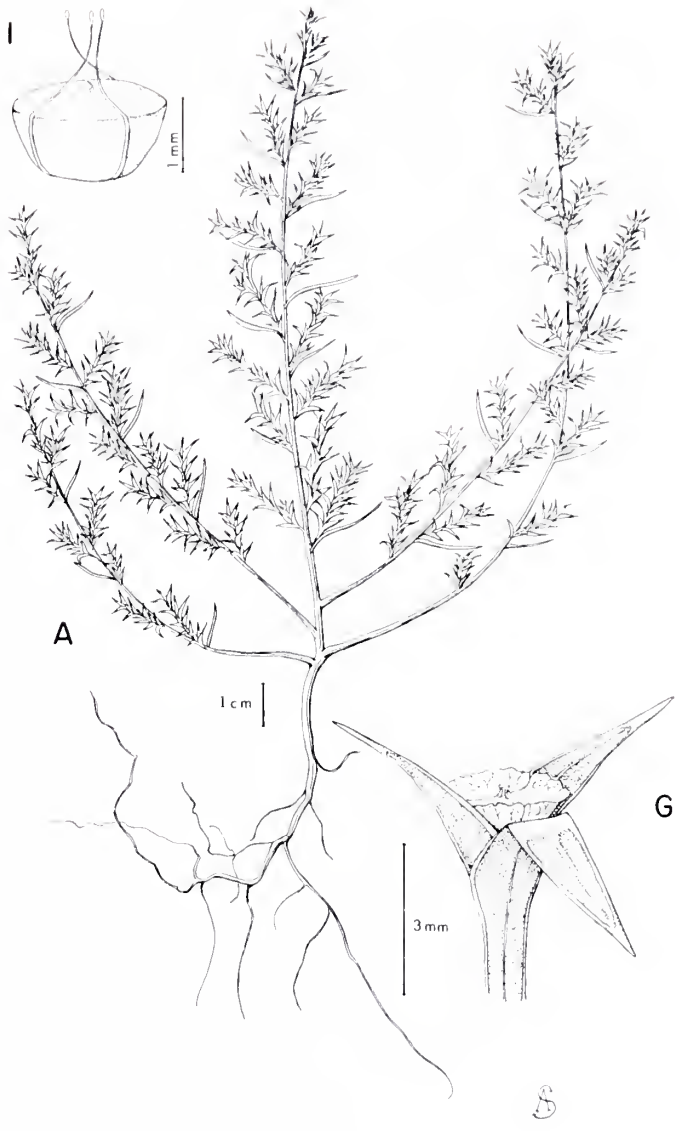
Fruiting: September-November

General Distribution: Native to eastern Europe and western Asia (Russia), now widespread in North America: Newfoundland to Georgia, especially along the coast

Description: Plants with **bisexual** flowers; **stigmas** 2, erect, 1.2-1.5 mm long; **style** 0.4-0.6 mm long; **ovary** obovoid; **fruit** obconic, closely investing the seed and nearly the same size; **seed** black, orbicular, 1.4-2.0 mm tall, 2-3 mm wide; **stamens** usually 5; **filaments** membranaceous, 1.4-2.0 mm long; **anthers** elliptic, yellow, 0.4-0.9 mm long; **perianth** 3-6 mm wide, rarely with short transverse wings in age; **lobes** scarious becoming hardened in fruit, lanceolate, 2.0-2.4 mm long, 1.2-2.0 mm broad, pungent; **bracts** 5-8 mm long, 1.5-4.0 mm broad, their bases (in age) much thickened, indurate and closely enclosing the fruit; **bracteoles** like the bracts but smaller; **inflorescence** of terminal spikes, 8-15 cm long, 13-20 mm broad, with 2-3 flowers at each node, of which only the lowermost develops; **leaves** linear, 3-7 cm long, 1.5-2.5 mm wide, pungent-tipped, thick and succulent, scabrous or glabrous; **stems** 3-6 (-10) dm tall, much-branched, the branches very stout, ascending or spreading, hispid, glabrate, sometimes glabrous, striate, commonly tinged with red; **root system** annual with a taproot ($2n = 36$).

Importance: Young shoots are sometimes eaten as a pot herb. The plant was once burned and the ashes used in making soap and glass. The juice of the fresh plant has been said to be an excellent diuretic.





2. *Salsola pestifer* A. Nelson

Common Name: Russian Thistle

Type Description: R. Brown, Prodr. Fl. Nov. Holland p. 411, 1810

Synonyms: *Salsola iberica* Sennen & Pau, *S. kali* var. *ruthenica* (Iljin) Soó in Soó and Jvorka, *S. kali* var. *tenuifolia* Tausch. not Mey., *S. ruthenica* Iljin, *S. tragus* of NY reports, not L.

Origin: A native of Northern Eurasia

Habitats: Cultivated fields and waste places, especially along railroads and where the soil is sandy

Habit: Erect, annual herb

Flowering: July-September

Fruiting: September-November

General Distribution: Southern Europe and Russia, now widespread throughout the world; in North America from Quebec to British Columbia south to Missouri and New York

Description: Plants with **bisexual** flowers; **stigmas** 2, erect with curling tips, 1.0-1.4 mm long; **style** 0.4-0.5 mm long; **ovary** obovoid; **fruit** obconic, closely investing the seed and nearly the same size; **seed** black, obconic, 1.5-2.0 mm long, 2-3 mm wide; **stamens** usually 5; **filaments** membranaceous, 1.8-2.5 mm long; **anthers** elliptic, yellow, 0.5-1.2 mm long; **perianth** 6-10 mm wide (including wings), transversely winged in age, the wings thin, crenate or dentate, conspicuously veined, often tinged with red, the perianth of the lower axil often merely carinate or with short thick wings; **lobes** (in flower) membranaceous, lanceolate, 1.5-1.7 mm long, 1.1-1.8 mm broad, apex acuminate, the lower portion becoming hardened and laterally winged in fruit, the upper portion remaining membranaceous; **bracts** narrowly lanceolate, broad-based, 0.5-1.5 cm long, 1.5-2.5 mm broad, closely enclosing the fruit, not connivent; **bracteoles** similar to the bracts but smaller; **inflorescence** of terminal and axillary spikes 1-6 cm long, 10-18 mm broad, with 2-3 flowers at each node, of which only the lowermost develops; **leaves** filiform, 1.2-4.5 cm long, 0.4-0.6 mm wide, pungent-tipped, subterete and succulent, scabrous or glabrous; **stems** 3-6 (-10) dm tall, much-branched, the branches very stout, ascending or spreading, short-villous or scabrous, sometimes nearly or quite glabrous, striate, commonly tinged with red; **root system** annual with a taproot ($2n = 36$).

Nomenclatural Note: This species is, occasionally, known under the name *S. australis* R. Br. (see, for example, Botschantzev, 1974), but Crompton (pers. comm.) has seen the type of *S. australis* and determined it to be *S. kali*; therefore, the earliest name for this species is *S. pestifer*.

6. SUAEDA

Common Name: Sea-blite

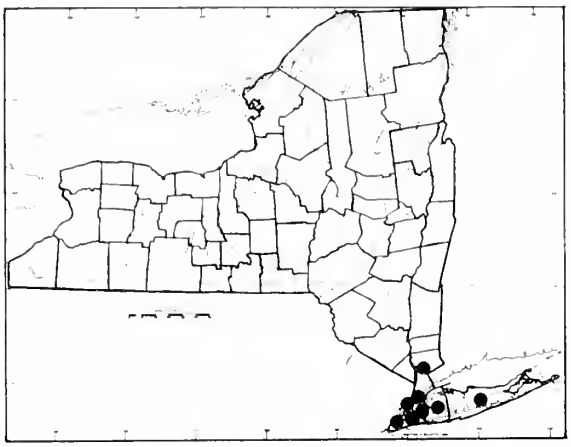
Authority: Forsskål, Fl. Aegypt. Arab. p. 69, 1775

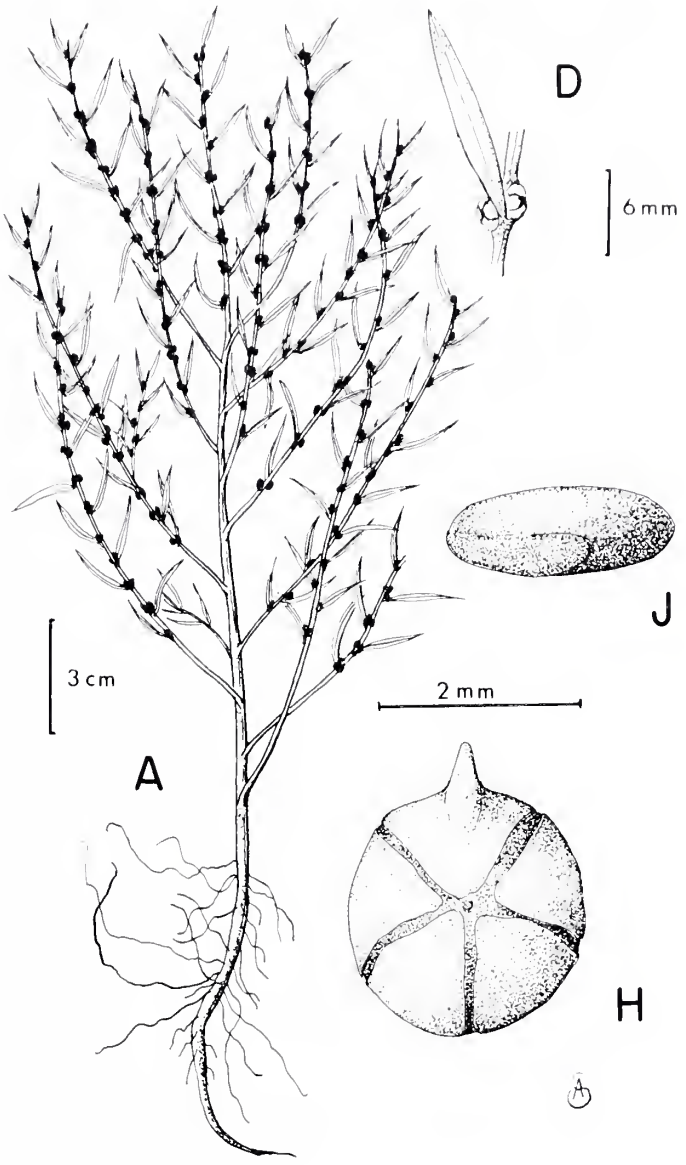
A genus of about 100 species of cosmopolitan distribution, except in boreal climates, and most diverse in the Middle East. Nearly all species of the genus are halophytes, found in salt marshes, salt lakes and other saline or alkaline habitats.

Description: Plants with **bisexual** flowers, or **monoecious** or **dioecious**; **stigmas** 2-5, filiform; **style** absent; **ovary** 1, superior, unilocular, with a single basal **ovule**; **fruit** an indehiscent utricle enclosed by the infolded perianth, and closely enveloping the seed, the pericarp membranaceous, usually non-adherent; **seed** 1, homomorphic, horizontal or vertical, lenticular; **embryo** coiled in a flat spiral; **perisperm** scanty or none; **radicle** centrifugal; **stamens** 5, hypogynous; **filaments** linear, distinct; **anthers** tetrasporangiate; **perianth** 5-lobed; **bracts** leaf-like, subtending the glomerules; **bracteoles** 2, scarious; **inflorescences** small irregular glomerules in axil of leaves; **leaves** simple, alternate, mostly succulent, narrow and often terete, never spine-tipped; **stems** more or less fleshy-herbaceous (or suffrutescent), glabrous to short-pubescent, from an **annual** taproot or **perennial** rootstalk.

KEY TO SPECIES

1. Mature seeds 1.0-1.5 mm diameter; sepals corniculate or carinate .....(2)
1. Mature seeds 1.5-2.0 mm diameter; sepals rounded or carinate .....(3)
   2. Sepals unequal, 1 or 2 corniculate, the others slightly keeled .....1. *S. calceoliformis*
   2. Sepals equally carinate .....2. *S. linearis*
3. Sepals rounded on abaxial surfaces .....3. *S. maritima*
3. Sepals carinate abaxially .....4. *S. rolandii*





1. *Suaeda calceoliformis* (Hook.) Moq.

Common Names: Matted Sea-blight, American Seepweed

Type Description: Hooker, Fl. Bor. Amer. 2: 126, 1838

Synonyms: *Chenopodium calceoliforme* Hook., *Dondia americana* (Pers.) Britton, *Salsola americana* (Pers.) Fern., *S. salsa* var. *americana* Pers.

Origin: A native of western North America and the boreal northeast

Habitats: Salt marshes (coastal in New York)

Habit: A prostrate to decumbent, occasionally erect, annual herb

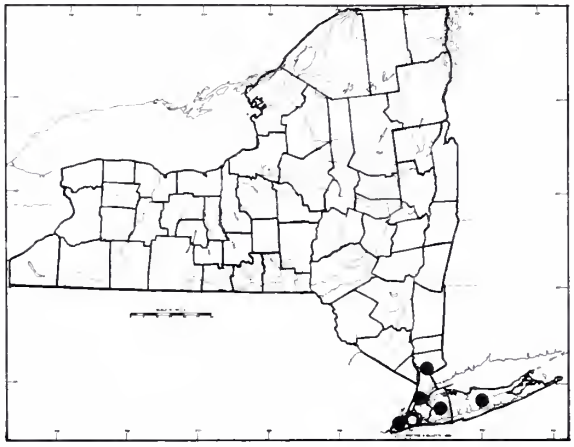
Flowering: August-October

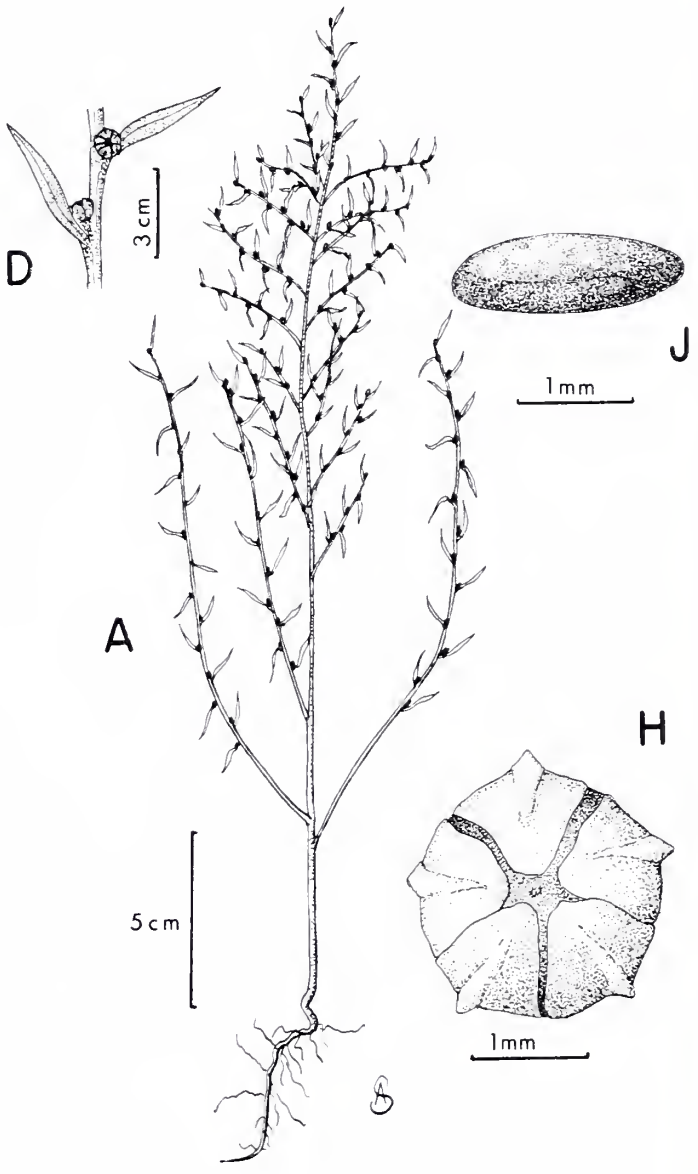
Fruiting: September-November

General Distribution: Newfoundland to the Northwest Territories south to California, Texas, Michigan and New Jersey

Description: Plants with **bisexual** flowers (or some unisexual by abortion); **stigmas** 2, erect or spreading, 0.1-0.2 mm long; **ovary** depressed-ovoid; **fruit** depressed-ovoid or ellipsoid, pericarp non-adherent, closely investing the seed, the fruit therefore nearly the same size as the seed; **seed** horizontal, dark red when young, black when mature, ovoid to ellipsoid, 1.0-1.5 (-1.7) mm in diameter, 0.5-0.7 mm thick, testa verrucate under high magnification; **stamens** 5; **filaments** membranaceous, 0.5-0.6 mm long; **anthers** oblong, yellow, 0.3-0.4 mm long; **perianth** 1.4-1.8 (-2) mm wide; **lobes** membranaceous, irregular and unequal, ovate to deltate, 0.5-0.8 mm long, 0.4-0.8 mm broad, one or two of the sepals usually more strongly hooded and corniculate than the others, horn 0.3-0.4 mm long, with a transverse wing occasionally developed at the base; **bract** linear, 2-10 mm long, 0.8-1.5 mm broad; **inflorescences** terminal on lateral branches, subspicate, the flowers crowded in the axils of reduced leaves, some flowers also in the axils of lateral branches; **glomerules** 1.5-2.5 mm in diameter; **leaves** linear, mostly semiterete, rarely flat, apex acute, margins entire, fleshy or succulent, green, occasionally becoming red or purple, lower leaves (0.5-) 1-4 cm long, 0.2-1.0 mm wide, shorter and broader (to 1.5 mm wide) in the inflorescence; **stems** prostrate or decumbent, occasionally erect, 20-65 cm tall, branches 1 to many, 19-31 cm long, spreading ascending to horizontal, the abundant flowering branches ascending or occasionally erect, mostly from the base of the plant, the lowermost sometimes opposite, stems rounded, mostly brownish green and slightly woody at the base, glabrous; **root system** annual with a woody taproot up to 50 cm long (2n = 54).

Nomenclatural Note: Atlantic coastal plants have, usually, been treated under the name *S. americana*, but Bassett & Crompton (1978b) have combined the eastern taxon with the widespread western taxon *S. calceoliformis* (often treated under the name *S. depressa*). I agree that the eastern plants fall within the range of variation of the western species.





2. *Suaeda linearis* (Ell.) Moq.

Common Name: Southern Sea-blite

Type Description: Elliott, Bot. S. C. & Ga. vol. 1, p. 332, 1821

Synonym: *Dondia linearis* (Ell.) Heller

Origin: Native to the Atlantic Coast of North America

Habitats: Salt marshes and sea beaches primarily along the coast

Habit: Erect, annual herb

Flowering: August-September

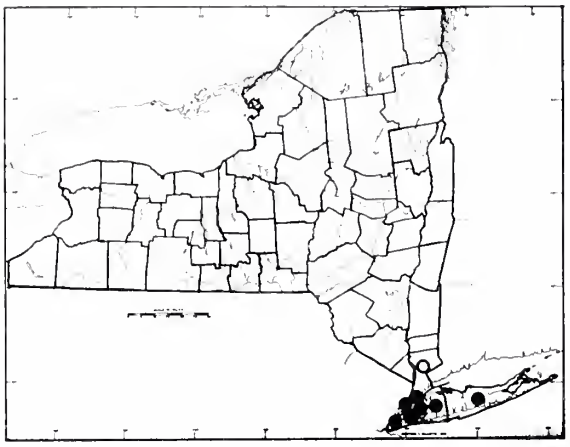
Fruiting: September-October

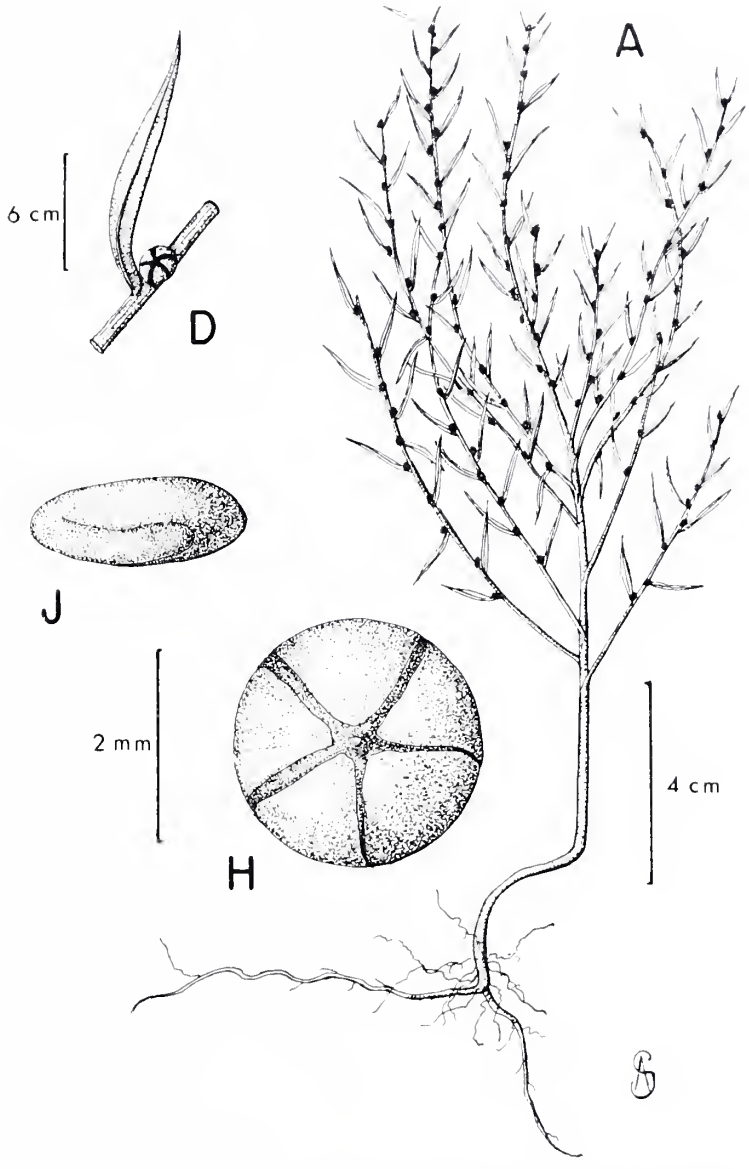
General Distribution: The Atlantic Coast of North America, from New York to the Yucatan Peninsula, Mexico and the West Indies

Rarity Status: This species is ranked G5 S3? by the New York Natural Heritage Program, and it appears on their watch list.

Description: Plants with **bisexual** flowers (or some unisexual by abortion); **stigmas** 2 (-5), spreading, 0.1-0.2 mm long; **ovary** depressed-ovoid; **fruit** depressed-ovoid, pericarp non-adherent, closely investing the seed and nearly the same size; **seed** horizontal, ovoid, black, 1.0-1.5 mm in diameter, 0.6-0.8 mm thick, the testa minutely reticulate; **stamens** 5; **filaments** membranaceous, 0.6-0.9 mm long; **anthers** oblong, yellow, ca. 0.2 mm long; **perianth** 1.5-2.0 mm wide; **lobes** membranaceous, broadly ovate to deltate, 0.5-0.6 mm long, 0.7-1.1 mm broad, equally carinate, apex obtuse; **bract** linear, 2-7 mm long, 0.7-1.1 mm broad; **inflorescences** terminal and axillary, spikes, 4-12 cm long, 2-4 mm broad, some glomerules in the axil of branches; **glomerules** 1-3 flowered, 2-4 mm in diameter; **leaves** narrowly linear, semiterete, apex acute, dark green, not glaucous, 0.7-1.5 (2.5) cm long, 3-5 mm wide, shorter in the slender elongated flowering branches; **stems** erect to ascending or decumbent, 2-9 dm tall, profusely branched, the slender branches ascending or spreading; **root system** annual, a taproot, sometimes persisting in warm regions.

Note: The similar species *Suaeda richii* Fern., with a non-keeled calyx, should be sought out in New York, since it is found in both Massachusetts and New Jersey. No specimens of that species from the State have been seen to date.





3. *Suaeda maritima* (L.) Dumort.

Common Name: White Sea-blite

Type Description: Linnaeus, Species Pl. I, p. 221, 1753

Synonyms: *Chenopodium maritimum* L., *Dondia maritima* (L.) Druce, *D. fernaldii* Standley, *Suaeda fernaldii* Standley

Origin: A native of Europe

Habitats: Coastal marshes

Habit: Growing mostly in wet salt marshes, high, tidal beaches and coastal mud flats

Flowering: August-September

Fruiting: September-November

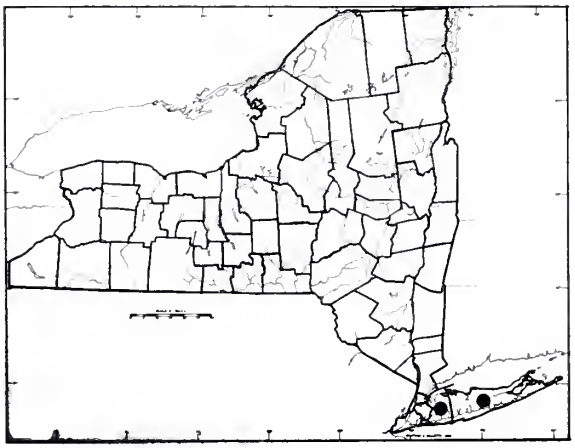
General Distribution: Coastal Europe: introduced in North America along the Atlantic Coast from Quebec to Florida and also reported from the Pacific Coast

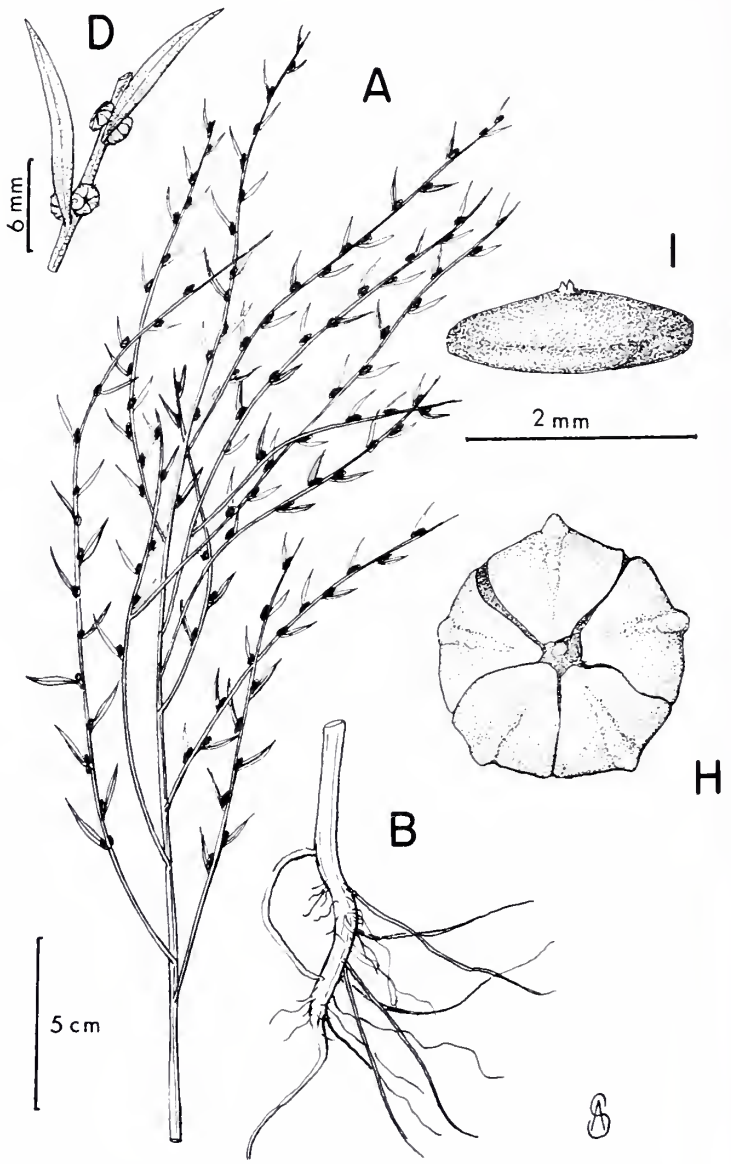
Rarity Status: This species is ranked G5 S3 by the New York Natural Heritage Program and has been placed on their watchlist.

Description: Plants with **bisexual** flowers (or some unisexual by abortion); **stigmas** 2-3 (-5), erect or spreading, 0.5-0.7 mm long; **ovary** depressed-ovoid; **fruit** depressed-ovoid, pericarp non-adherent, closely investing the seed and nearly the same size; **seed** horizontal, red-brown to black, ovoid, (1.5-) 1.8-2.2 mm in diameter, 0.7-0.9 mm thick, testa faintly reticulate; **stamens** 5; **filaments** membranaceous, 1.0-1.7 mm long; **anthers** oblong, yellow, 0.4-0.5 mm long; **perianth** 2.0-3.3 mm wide; **lobes** membranaceous, broadly ovate to deltate, 1.5-1.7 mm long, 0.7-1.0 mm broad, pale green, rounded or obscurely carinate on back, occasionally hooded or keeled at maturity, the apex rounded to obtuse; **bracts** oblong, 0.5-0.7 mm long; **inflorescences** of glomerules in the axils of leaves; **glomerules** subglobose, 1-3 (-4) flowered, 3-5 mm in diameter; **leaves** linear, mostly subterete, occasionally flat, ascending or spreading, fleshy to succulent, the apex acute, margins entire, glaucous, dark green, 0.5-4.0 (-5) cm long, 0.8-1.7 mm wide, the leaf base only slightly, if at all, wider than the rest of the blade; **stems** erect to ascending, decumbent or prostrate, terete, mostly light brown, and slightly woody at the base, plants 0.5-6 dm tall, profusely branched, the slender branches ascending to spreading or decumbent, mostly from the lower parts of the plant; **root system** a slightly woody taproot, annual, but sometimes persisting in warmer regions (2n = 36).

Variation: This is a highly variable species, but all of our specimens are the typical var. *maritima*.

Importance: This species is used for potash extraction in Europe and Asia. The fresh plant has laxative properties that disappear on boiling.





4. *Suaeda rolandii* Bassett & Crompton

Common Name: Sea-blite

Type Description: Bassett & Crompton, Can. Jour. Bot., vol. 56, p. 588, 1978

Origin: A native of the coasts of northeastern North America

Habitats: Salt marshes

Habit: Erect or procumbent, annual herb

Flowering: August-September

Fruiting: September-October

General Distribution: Nova Scotia to Quebec south to New Jersey along the coast

Rarity Status: This species is very rare throughout its range, and it has been proposed as a Federally Endangered species, currently ranked G1G2Q SH by the New York Natural Heritage Program.

Description: Plants with **bisexual** flowers (or some unisexual by abortion); **stigmas** 2-3, erect or spreading, ca. 0.2 mm long; **ovary** depressed-ovoid; **fruit** depressed-ovoid, pericarp non-adherent except on the more flattened fruits, where it is adherent, closely investing the seed and nearly the same size; **seed** horizontal, dimorphic, black or reddish brown, the more flattened, brown seeds developing later in the season, 1.5-2.3 mm in diameter, 0.5-0.7 mm thick, testa of the black and reddish-brown seeds shiny and finely reticulate, whereas the flattened, brown seeds are dull with no distinctive surface pattern; **stamens** 2-5; **filaments** membranaceous, ca. 1 mm long; **anthers** oblong, white, ca. 0.2 mm long; **perianth** ca. 3.5 mm in diameter; **lobes** membranaceous, ovoid, ca. 1 mm long, 1.0-1.5 mm broad, hooded and keeled abaxially, the apex rounded; **bracts** oblong, 0.4-1.2 mm long; **inflorescences** of glomerules in the axils of leaves; **glomerules** subglobose, 1- to 3-flowered, 4-5 mm in diameter; **leaves** linear, mostly subterete, occasionally flat, ascending or spreading, very fleshy and succulent, the apex acute, margins entire, glaucous, dark-green, 1.7-2.5 (-3) cm long, 0.7-1.5 mm wide, the base of leaf not wider than the rest of the blade, becoming bract-like and shorter towards the inflorescence; **stems** erect or procumbent, the plants 2-7 dm tall, branches 1-several, ascending or erect, mainly from the uppermost part of the plant, stems rounded, light brownish-green, becoming woody at the base near maturity; **root system** annual with a woody taproot (2n = 90).

Note: This species is apparently allotetraploid in origin, derived from *S. calceoliformis* and *S. maritima*.

7. BASSIA

Common Names: Bassia, Summer-cypress (Kochia)

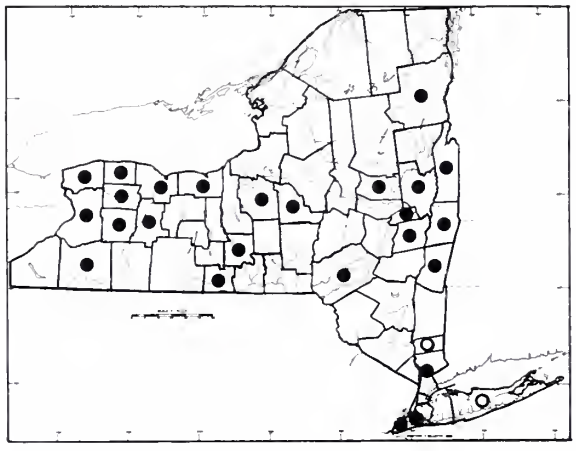
Authority: Allioni, Mélanges Philos. Math. Soc. Roy. Turin, vol. 3, p. 177, 1766

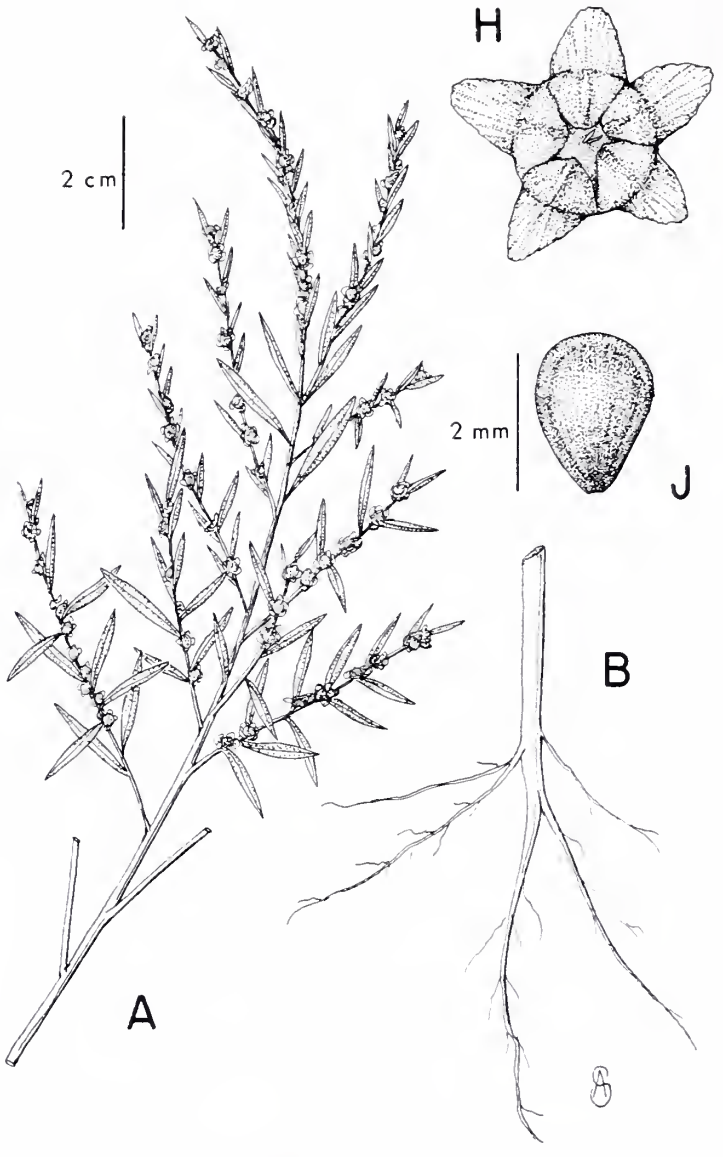
A genus of about 30 species, when recognized in the broad sense. *Kochia* is nearly cosmopolitan in distribution. Scott (1978a) combined *Kochia* and *Bassia*, citing the only difference between the two genera as the nature of the calyx in fruit. *Kochia* has a winged fruiting calyx, whereas *Bassia* has no wings, but it may have spines or other protuberances. Scott also noted that some *Kochia* species have spines with wings developed between them. The following treatment follows Scott in combining the two genera.

Description: Plants with all **bisexual** flowers or **polygamous**; **stigmas** 2 (-3), filiform; **style** 1 or absent; **ovary** 1, superior, unilocular with a single basal **ovule**; **fruit** an indehiscent utricle, enclosed in the accrescent perianth, pericarp membranaceous, non-adherent; **seed** 1, homomorphic, horizontal, rarely vertical in a few bisexual flowers; **embryo** annular or subannular; **perisperm** abundant, farinaceous, or absent; **radicle** centrifugal; **stamens** 5, hypogynous; **filaments** linear, distinct; **anthers** tetrasporangiate; **perianth** 5-lobed, connate to above the middle with reflexed lobes, becoming accrescent, chartaceous in fruit, with horizontal wings, spines, lobes or without appendages; **bracts** linear; **bracteoles** absent; **inflorescences** of terminal spikes of single or paired flowers, or rarely glomerules at the nodes; **leaves** simple, alternate, herbaceous or succulent; **petioles** very short or absent; **stems** herbaceous, with an **annual** taproot or **perennial** root system.

KEY TO SPECIES

1. Fruiting perianth winged ..... 1. *B. scoparia*
1. Fruiting perianth with spines or tubercles ..... (2)
   2. Leaves linear to filiform; fruiting perianth with short, connate tubercles ..... 2. *B. hirsuta*
   2. Leaves oblanceolate; fruiting perianth with long, curled spines ..... [*B. hyssopifolia*, a waif]





1. *Bassia scoparia* (L.) A. J. Scott

Common Names: Summer-cypress, Belvedere-cypress, Fire-weed, Kochia, Mock-cypress, Mexican fire-bush

Type Description: Linnaeus, Species Pl. I, p. 221, 1753

Synonyms: *Kochia alata* Bates, *K. scoparia* (L.) Roth ex Schrad.

Origin: Native to Asia and southern Europe

Habitats: Waste places

Habit: Erect, annual herbs

Flowering: Late July-September

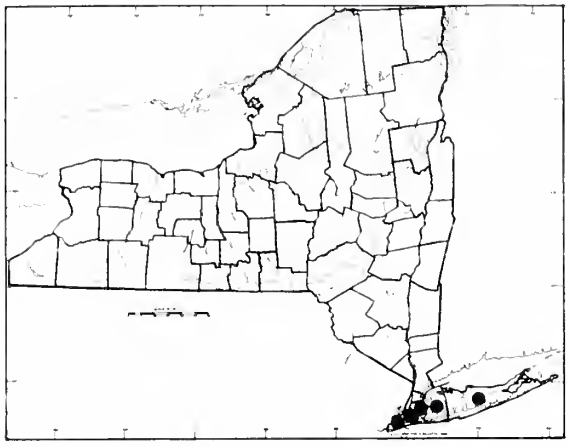
Fruiting: Late August-October

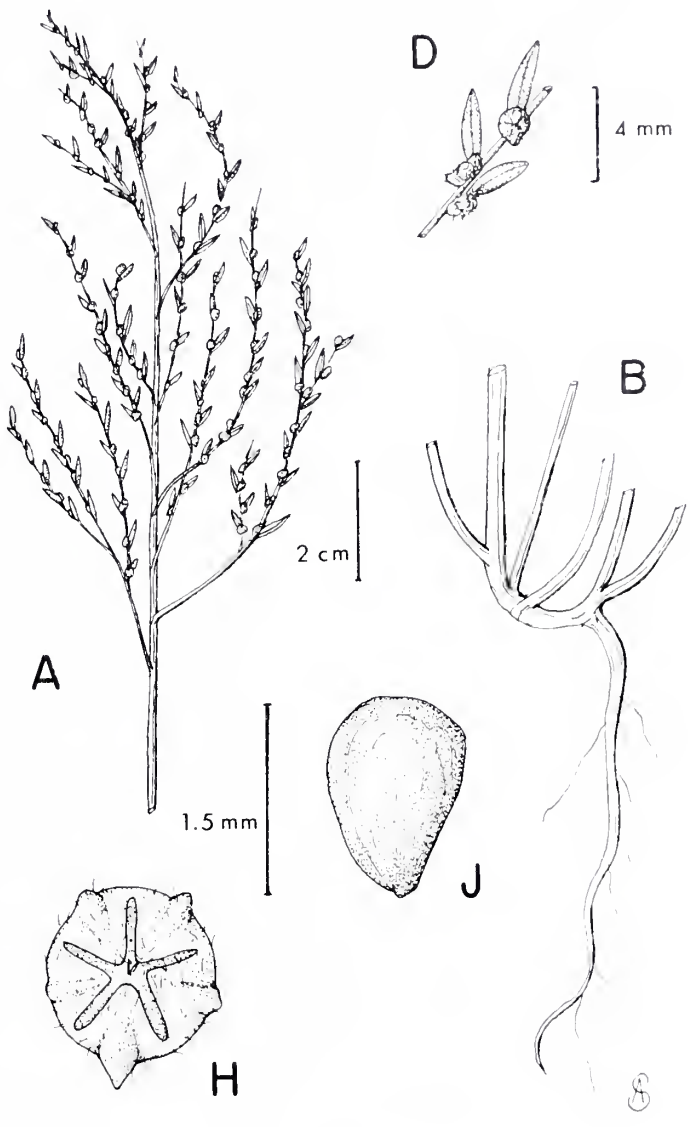
General Distribution: Native to Eurasia; naturalized in North America from Nova Scotia to British columbia south to Colorado, Texas and Pennsylvania

Description: Plants with **bisexual** flowers (sometimes functionally unisexual); **stigmas** 2 (-3), erect or spreading, 1-2 mm long; **style** 0.2-0.3 mm long; **ovary** depressed-ovoid; **fruit** depressed-ovoid, 1.4-1.6 mm long, 0.9-1.2 mm broad, the pericarp free, eventually disintegrating; **seed** horizontal, brown to black, obovoid, 1.4-1.6 mm in long, 0.9-1.2 mm broad, 0.4-0.6 mm thick, testa smooth or glandular; **stamens** 5; **filaments** membranaceous, 1.0-1.3 mm long; **anthers** ellipsoid, light yellow, ca. 0.5 mm long; **perianth** 2-4 mm in diameter at maturity, star-shaped; **lobes** triangular, 0.4-0.5 mm long, 0.5-0.6 (-1.5) mm broad, in fruit accrescent, chartaceous, each lobe bearing a highly variable membranaceous dorsal lobe or wing, varying from short and tubercle-like to usually flat, oblong-rotund or rotund, semi-membranaceous, cellular reticulate, often striate, entire, lobed or bifid, lobes or wings 0.4-0.7 (-1) mm long and 0.7-1.5 mm broad; **bracts** linear, 3-18 mm long; **inflorescences** terminal spikes, 3-10 cm long, or flowers spaced along the branches in the axils of leaves, the flowers sessile, usually paired, sometimes single, rarely in 3-5 flowered glomerules, the flowers enclosed by tufts of short or long hairs; **leaves** thin, linear to lanceolate or oblanceolate to narrowly obovate, 2-7 (-10) cm long, 0.5-8.0 (-12) mm broad, apex acute or obtuse to rounded, tapering to the base, entire, ciliate, usually villous or pilose, with hairs to ca. 6 mm long, glabrate (especially above); **petioles** 0-3 mm long; **stems** erect, 3-20 (-40) dm tall, usually branched from the base, the branches erect to spreading, very leafy, glabrous, short-villous or short-pilose, with silvery or rust-colored hairs, stems and branches yellowish-green, green or streaked with red, often turning red or reddish purple in fall; **root system** annual with a taproot (2n = 18).

Infraspecific Variation: Several forms and varieties have been described; those with very narrow, thread-like leaves have been called "*Kochia scoparia* var. *culta* Farw."; those with broader leaves and downy stems have been called "*K. scoparia* var. *pubescens* Fenzl.", while the typical plants have broader leaves and sparsely hairy to glabrous stems.

Importance: Often cultivated in the past and still, occasionally, cultivated as an annual hedge along walkways and driveways and for the red color in fall. In Russia they are cultivated for broom making. This species has one of the most highly allergenic pollen produced in the family.





2. *Bassia hirsuta* (L.) Aschers. ex Schwein.

Common Name: Bassia

Type Description: Linnaeus, Species Pl. I, p. 221, 1753

Origin: A native of Coastal Europe

Habitats: Coastal saline or brackish soils

Habit: Erect, annual herb

Flowering: August

Fruiting: September

General Distribution: Coastal Europe, introduced into the United States along the coast from New England to Maryland

Description: Plants with **bisexual** flowers; **stigmas** 2, erect or spreading, ca. 0.6 mm long; **style** ca. 0.2 mm long; **ovary** depressed-globose; **fruit** depressed-oblong, pericarp free; **seed** horizontal, lenticular, dark brown to black, oblong, 1.2-1.8 mm long, 0.8-1.2 mm broad, 0.4-0.6 mm thick, testa glabrous; **stamens** 5; **filaments** membranaceous, 0.8-1.0 mm long; **anthers** ellipsoid, light yellow, 0.4-0.5 mm long; **perianth** 1.2-2.0 mm wide; **lobes** deltate, 0.9-2.0 mm long, 0.4-0.7 mm wide, pubescent, incurved in flower, persistent and incurved over the seed in fruit, developing short, stout dorsal tubercles on 3 of the lobes, the tubercles 0.5-1.0 mm long; **bracts** absent; **inflorescences** of solitary flowers or in short spikes from the upper leaf axils, 3.5-5.0 cm long; **leaves** fleshy, linear-oblong to linear, semi-terete, 0.5-1.0 cm long, 0.8-1.4 mm broad, apex rounded, pubescent; **petioles** absent; **stems** 1.5-4.0 dm tall, branching from the base, the branches erect, turning pink in autumn; **root system** annual with a taproot ($2n = 18$).

Importance: This plant has been used on the island of Cyprus for soda extraction.

Waifs: *Bassia hyssopifolia* (Pall.) Kuntze, which differs from *B. hirsuta* in having flat leaves and curved spines up to 1.5 mm long on the fruiting perianths, was found by Joseph Monachino in three locations in Queens Co. in the 1940s, but it has not been reported since.

8. CORISPERMUM

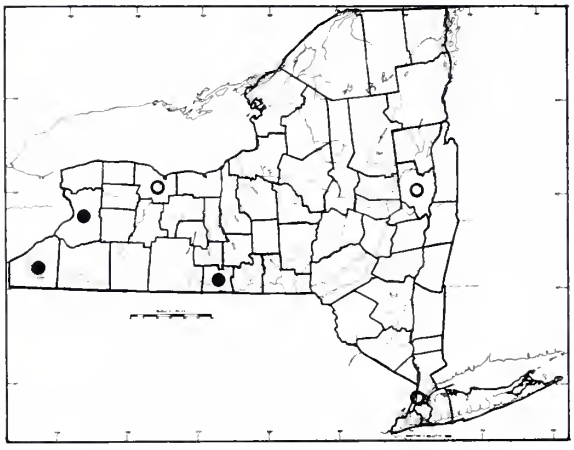
Common Name: Bugseed

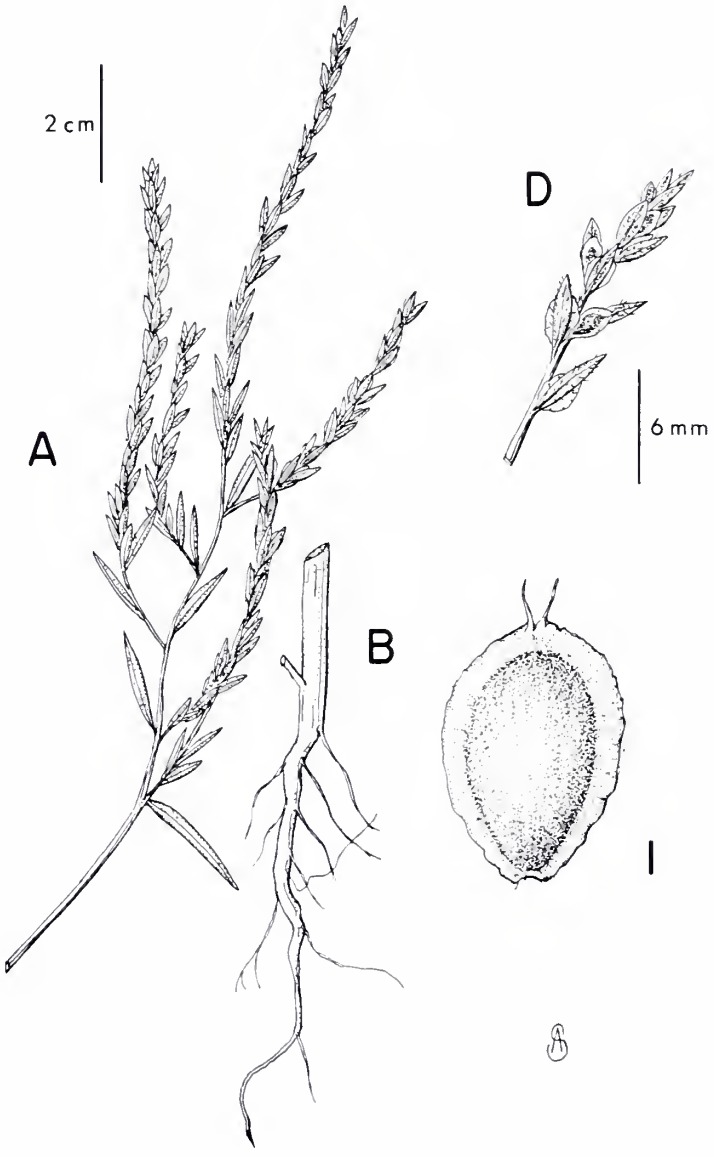
Authority: Linnaeus Species Pl. I, p. 4, 1753

A genus of 60 species in the north temperate parts of the world. The genus is diverse, and distinctions between species are often difficult to make. For instance, one important character is the presence of winged fruit; however, Brooks (1986) stated that some plants have both winged and wingless fruits. The North American plants needs to be studied in connection with Eurasian materials.

KEY TO SPECIES

1. Fruit lacking conspicuous wing-margins .....[*C. orientale*, a waif]
1. Fruit conspicuously wing-margined .....(2)
   2. Spikes dense; bracts closely overlapping and all at least as broad as the fruit .....1. *C. hyssopifolium*
   2. Spikes loose; bracts not distinctly overlapping, especially along lower-most portion of spike, and at least the lower bracts much narrower than the fruit .....[*C. nitidum*, a waif]





1. *Corispermum hyssopifolium* L.

Common Name: Bugseed

Type Description: Linnaeus, Species Pl. I, p. 4, 1753

Synonyms: *Cycloloma hyssopifolium* var. *americanum* Nutt., *C. americanum* Nutt., *C. marginale* Rydb., *C. imbricatum* A. Nels., *C. simplicissinum* Lunell

Origin: A native of Eurasia

Habitats: Sandy fields or beaches

Habit: An erect, annual herb

Flowering: August-September

Fruiting: September-October

General Distribution: Illinois to North Dakota and Idaho south to Texas and Arizona

Description: Plants with **bisexual** flowers; **stigmas** 2, subfiliform, recurved, ca. 0.4 mm long; **style** 1, ca. 0.6

mm long; **ovary** 1, ovoid, unilocular, with a single, basal **ovule**; **fruit** an oval to rounded, flattened or concave, indehiscent utricle, 3.3-4.2 mm long, 2.0-2.8 mm broad, exserted from the perianth, but usually hidden by the bract, the margin with a pale wing, 0.2-0.5 mm wide, pericarp somewhat hardened and loosely surrounding the seed, non-adherent; **seed** 1, vertical, homomorphic, stramineous, oval, 3.5-4.0 (-5) mm long, 1-2 (-4) mm broad, testa glabrous; **embryo** annular; **perisperm** abundant, farinose; **radicle** basal; **stamens** 1-3 (-5), hypogynous; **filaments** linear, membranaceous, 0.5-1.0 mm long, distinct; **anthers** tetrasporangiate, ellipsoid, yellow, 0.3-0.5 mm long; **perianth** 1 sepal, scarious, oblong, 0.6-1.0 mm long, 0.4-0.9 mm broad, apex rounded; **bract** often imbricate, linear to oval, usually erect, 4-10 mm long, 2.0-2.6 mm broad, acute or acuminate, stellate pubescent or glabrate, the lowest longer and narrower, all except the lowest as broad as or broader than the fruit, these rarely narrower; **bracteoles** absent; **inflorescences** terminal and axillary spikes 4-9 cm long, 4-8 mm broad, the flowers at each node solitary or in glomerules; **leaves** simple, alternate, herbaceous, broadly linear, 0.5-4.0 (-9) mm long, 0.1-0.3 (-0.5) mm broad, entire, cuspidate, glabrous or stellate-pubescent; **petioles** absent; **stems** herbaceous, slender, much-branched, 1.5-6.0 dm tall, the branches spreading, striate, glabrous or stellate-villous, often tinged with red, sparsely leafy; **root system** annual with a taproot.

Waifs: *Corispermum nitidum* Kitaibel ex Schultes has been collected in Buffalo (Erie Co.), Rochester (Monroe Co.), and Mechanicsville (Saratoga Co.); *C. orientale* Lamarck was collected in Buffalo (Erie Co.) and New York City (New York Co.) in the nineteenth century but not since.

9. POLYCNEMUM

Common Name: Polycnemum

Authority: Linnaeus, Species Pl. I, p. 35, 1753

A genus of 6-7 species, native to Europe and central Asia.

Waif: *Polycnemum majus* A. Br., was collected at Moquette Mill, Yonkers (Westchester Co.) in 1890.

10. AXYRIS

Common Name: Russian Pigweed

Authority: Linnaeus, Species Pl. II, p. 979, 1753

A genus of seven species native to northern Asia and Europe; *A. amaranthoides* is often a contaminant of grain in Europe, and it has now become naturalized in the Great Plains.

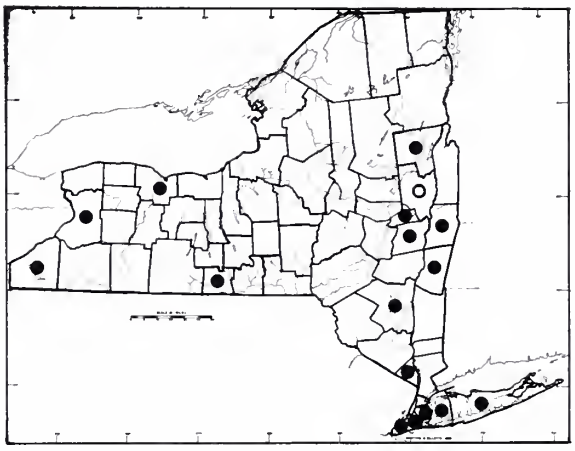
Waif: *Axyris amaranthoides* L. appeared at the Port of Albany (Albany Co.) and was collected in 1950.

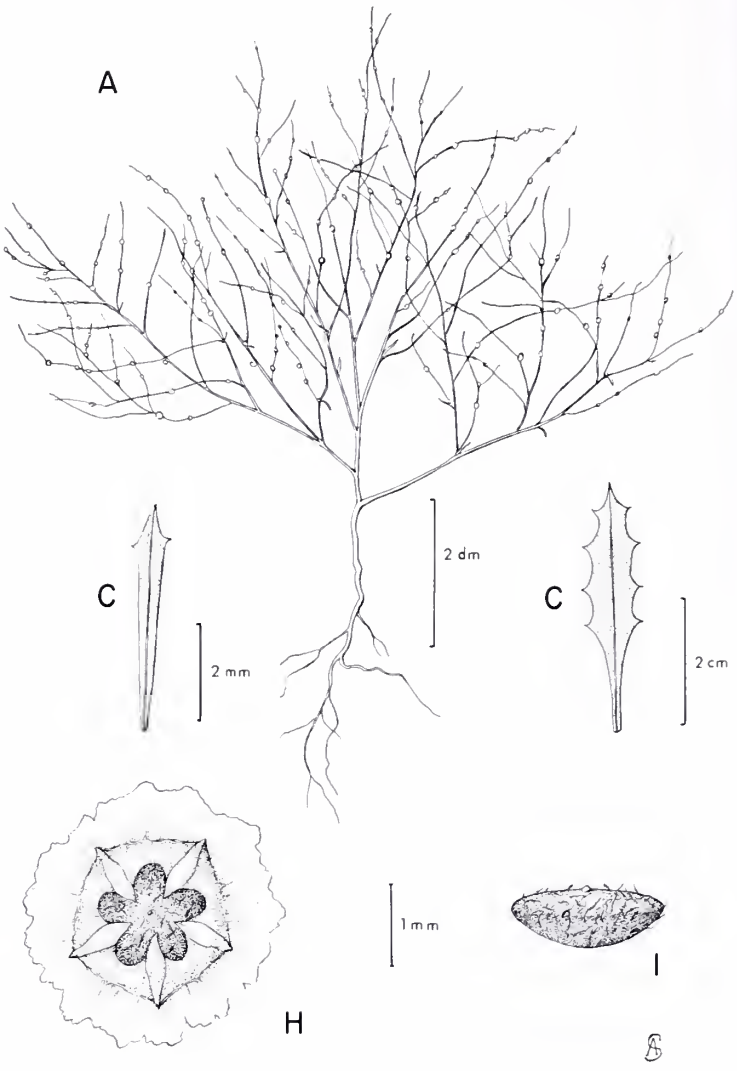
11. CYCLOLOMA

Common Name: Winged Pigweed

Authority: Moquin-Tandon, Chenop. Monogr. Enum. p. 17, 1840

A monotypic genus native to North America.





1. *Cycloloma atriplicifolium* (Spreng.) Coult.

Common Name: Winged Pigweed

Type Description: Sprengel, Bot. Gart. Hal. Nachr. 1: 35, 1801

Synonym: *Salsola atriplicifolia* Spreng.

Origin: A native of central North America

Habitats: Sandy fields, beaches, blowouts, roadsides and waste places

Habit: A densely-branched, erect to spreading annual herb

Flowering: July-September

Fruiting: August-November

General Distribution: Native from Indiana to Saskatchewan south to Mexico and Texas, now introduced eastward to Quebec, New York and New Jersey

Description: Plants **polygamodioecious**; **stigmas** 3, subfiliform, erect or spreading, 0.5-1.0 mm long; **style** 1, ca. 0.1 mm long, or absent; **ovary** 1, superior, depressed-ovoid, densely tomentose, unilocular with a single basal **ovule**; **fruit** a depressed-globose, indehiscent utricle, pericarp membranaceous, pubescent, non-adherent, closely investing the seed and nearly the same size; **seed** 1, horizontal, lenticular, black, 1.4-1.5 mm in diameter, 0.8-1.0 mm thick, testa glabrous; **embryo** annular; **perisperm** farinose, abundant; **radical** centrifugal; **stamens** 5, hypogynous; **filaments** subulate, membranaceous, 1.0-1.2 mm long; **anthers** tetrasporangiate, oblong, yellow, 0.2-0.3 mm long; **perianth** 5-lobed, hemispheric, developing a broad, dentate, membranaceous wing, 2.5-4.0 mm diameter, more or less villous, becoming red or purple in fruit; **lobes** triangular-ovate, 0.4-0.6 mm long, 0.4-0.8 mm broad, inflexed, apex obtuse, carinate; **bract** narrowly oblong to narrowly elliptic, 0.3-1.0 cm long, 0.3-0.9 mm broad, entire or toothed; **bracteoles** absent; **inflorescence** a broad panicle, 9-19 cm long, 5-15 cm broad, the flowers solitary at each node, sessile; **leaves** simple, alternate, herbaceous, oblong or narrowly oblong, 2-8 cm long, 0.6-1.5 cm broad, apex acute, base usually tapering to a petiole, margins coarsely and irregularly sinuate-dentate, teeth acute, mucronate, young leaves white-tomentose, becoming glabrate, then usually falling from fruiting plant; **petioles** 0-8 mm long; **stems** herbaceous, erect or spreading, densely branched, 1.5-8.0 dm tall, as broad as tall, the branches slender, obtusely angled, striate, white villous-tomentose when young, becoming glabrate; **root system** annual with a taproot.

12. MONOLEPIS

Common Names: Poverty Weed, Spear-leafed Goosefoot, Monolepis

Authority: Schrader, Index Semin. Horti Acad. Goeth. p. 4, 1830

A genus of 3-6 species native to northern Asia, North America and Patagonia.

Waif: *Monolepis nuttalliana* (Schultes) Greene, was collected once at Cornell University (Tompkins Co.) in 1932 and has been reported from Monroe County.

13. CHENOPODIUM

Common Names: Pigweed, Goosefoot

Authority: Linnaeus, Species Pl. 1, p. 218, 1753

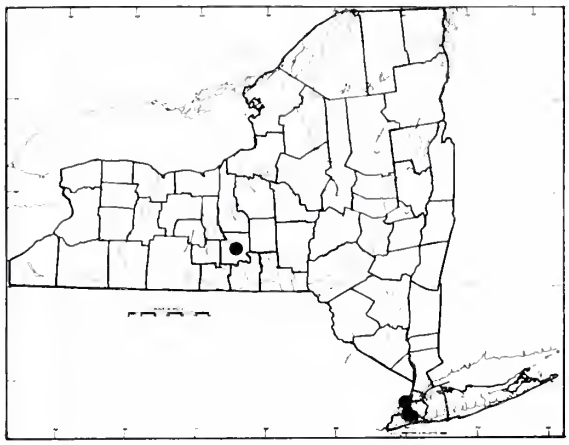
A genus of 70-150 species worldwide. The plants are often associated with xeric environments and most species are weedy within and outside their ranges. *Chenopodium* is notorious for its taxonomic difficulty, largely attributable to phenotypic plasticity, but with some of the variability resulting from hybridizations. Compounding this situation is the large number of species named within the past 75 years, particularly within the *Chenopodium album* complex, leading to many conflicting taxonomic treatments. Many of these recently-described taxa are probably best considered varieties of earlier-named species. Some pigweeds are well-known as tumbleweeds and noxious garden pests. Other species are grown as pot-herbs, and *C. ambrosioides* L., Mexican tea, is extracted for "oil of chenopodium," which has medicinal properties. Quinoa (*C. quinoa* Willd.) is a South American grain staple in the highlands of the Andes. Scott (1978b) reviewed the classification of the subtribe Chenopodiinae (including *Blitum*, *Chenopodium*, *Dysphania*, and *Monolepis*). In his review he placed *Chenopodium capitatum* and related species in the genus *Blitum*, based upon the fleshy perianth, vertical seed with a superior radicle, and the hippocrepiform embryo. I have followed the more traditional concept of *Chenopodium* by continuing to include these species within the genus. I feel that further comparative studies with other genera of the family are needed to clarify the morphological lines along which *Chenopodium* might best be split.

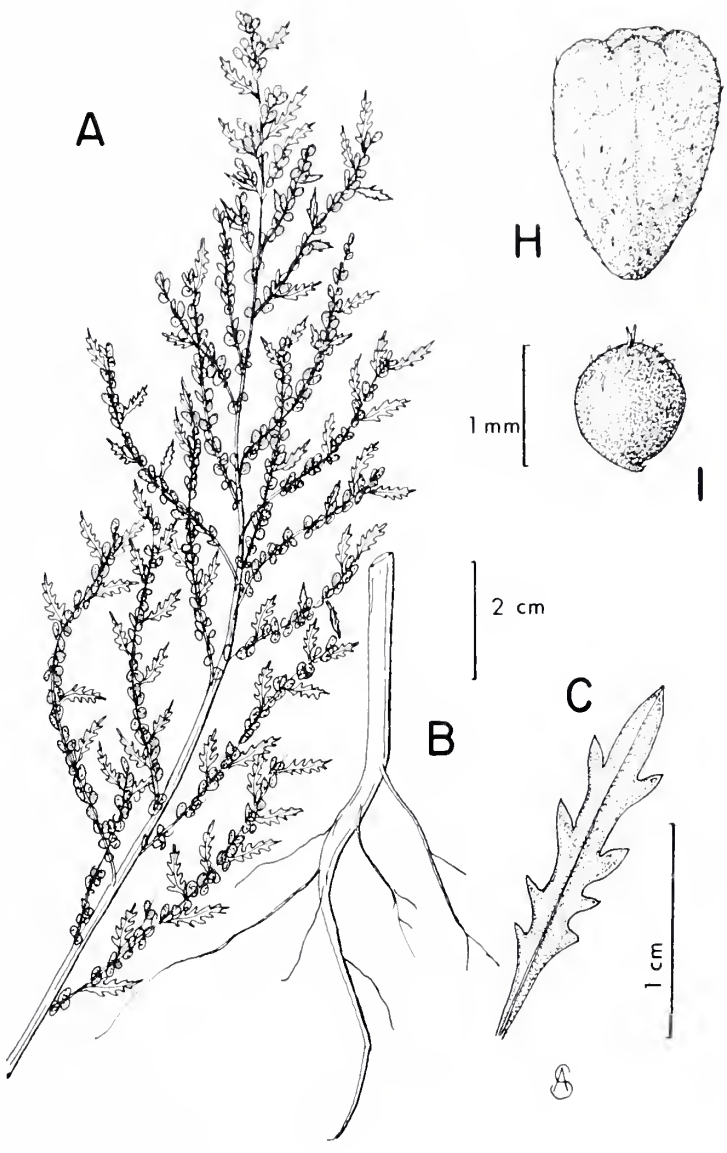
Description: Plants with **bisexual** or rarely **unisexual** flowers, then the terminal flower of glomerules often male or bisexual and the lateral female; **stigmas** 2-5, filiform; **style** 1, or usually absent; **ovary** 1, superior, unilocular with a single basal **ovule**; **fruit** an indehiscent utricle, often enclosed in the infolded perianth, the pericarp membranaceous or fleshy, adherent or not; **seed** 1, horizontal or vertical, usually lenticular; **embryo** annular or incompletely annular, surrounding the copious farinaceous **perisperm**, the **radicle** inferior or centrifugal; **stamens** 5 or fewer, hypogynous or subperigynous; **filaments** linear, distinct or sometimes connate at the base; **anthers** tetrasporangiate; **perianth** a single series, usually 5 lobes, rarely 3-4, commonly united at least at their bases; **bract** present or absent, usually subtending glomerules, blade-like or needle-like; **bracteoles** absent; **inflorescences** terminal or axillary spikes, or the flowers often clustered into axillary glomerules; **leaves** simple, alternate, herbaceous, pinnatifid, usually unlobed, margin entire, dentate or serrate; **petioles** present or absent; **stems** herbaceous, rarely suffrutescent, usually either glandular or farinaceous, covered with small, white, inflated hairs; **annual** or **perennial** from shallow **root systems**, or, more often from a taproot.

KEY TO SPECIES

1. Calyx not obviously veined, sepals usually fused only near the base; leaves entire, toothed or lobed (rarely pinnatifid) .....(2)
1. Calyx veined, connate nearly to the sepal tips; leaves deeply pinnatifid .....1. *C. multifidum*
2. Plants variously pubescent or glandular pubescent but not completely glabrous or farinose (mealy) .....(3)
2. Plants glabrous or farinose .....(6)
3. Seeds chiefly horizontal, 0.7-1.0 mm broad .....(4)
3. Seeds vertical, 0.5-0.7 mm broad (flowers in small glomerules in the axils of the lobed leaves) .....2. *C. pumilio*
4. Leaves linear, entire or nearly so; plants not aromatic .....[*C. aristatum*, a waif]
4. Leaves lanceolate, serrate, dentate or lobed; plants aromatic .....(5)
5. Flowers in glomerules and short spikes, the upper bracteate; lower leaves serrate, the upper leaves entire; pericarp smooth .....3. *C. ambrosioides*
5. Flowers solitary or in small cymes, ebracteate; leaves all pinnatifid; pericarp reticulate, having black and white stripes circling 2/3 of the seed .....4. *C. botrys*

6. Seeds vertical, occasionally with a few horizontal seeds in the same inflorescences ..... (7)
6. Seeds horizontal, rarely with vertical seeds in the same inflorescences .....(11)
7. Plants perennial; stigmas more than 0.8 mm long; seeds more than 1.5 mm diameter .....5. *C. bonus-henricus*
7. Plants annual; stigmas less than 0.8 mm long; seeds less than 1.5 mm diameter .....(8)
8. Leaves glabrous, the undersurfaces not white or sparsely whitened; flowers in globose heads .....(9)
8. Leaves farinose, the undersurfaces white; flowers not in heads or glomerules .....6. *C. glaucum*
9. Terminal flower vertical like the others; flowers borne in capitate glomerules; fruits fleshy, bright red .....(10)
9. Terminal flower horizontal, the others vertical; flowers borne in irregular glomerules; fruits usually not fleshy, green .....
.....7. *C. rubrum*
10. Glomerules subtended by bracts .....[*C. foliosum*, a waif]
10. Glomerules not subtended by bracts .....8. *C. capitatum*
11. Primary leaves linear, ca. 5 times longer than wide, less than 2 cm in width .....(12)
11. Primary leaves deltoid, rhombic, oblong, or ovate, ca. 3 times longer than wide, usually more than 2 cm in width .....(13)
12. Flowers in small cymes; plants glabrous or pubescent .....[*C. aristatum*, a waif]
12. Flowers in glomerules, farinose (mealy) .....9. *C. pratericola*
13. Fruits maturing unevenly, such that mature fruit and young perfect flowers may be present in a glomerule at the same time; leaves thin; sepals weekly or not at all keeled .....(14)
13. Fruits maturing synchronously within the glomerules, most of them appearing to be at the same stage of development; leaves thin, membranaceous or coriaceous..... (15)
14. Leaf margins with short, ascending teeth; leaves rounded or tapered at the base, gradually reduced upward on the stem, intergrading with entire inflorescence bracts; seeds 1.1-1.5 mm in diameter .....10. *C. standleyanum*
14. Leaf margins coarsely dentate; leaves subtruncate to cordate at the base; inflorescence ebracteate or the main branches subtended by rather well-developed leaves; seeds 1.5-2.5 mm in diameter .....11. *C. simplex*
15. Inflorescence-axes and abaxial sepal surfaces glabrous .....(16)
15. Inflorescence-axes and abaxial sepal surfaces copiously farinose (mealy), at least when young .....(17)
16. Leaves ovate to oblong, entire, or rarely with a single, inconspicuous tooth on each margin; stems 4-angled .....
.....[*C. polyspermum*, a waif]
16. Leaves deltate, the margins dentate; stems not 4-angled .....12. *C. urbicum*
17. Leaves entire, rhombic to ovate, ill scented .....[*C. vulvaria* L., a waif]
17. Leaves dentate, serrate, or sinuously-dentate, rarely entire .....(18)
18. Seeds with acute margins; testa minutely and closely pitted .....13. *C. murale*
18. Seeds with obtuse margins; testa smooth or alveolate- reticulate .....(19)
19. Perianth lobes united to above the widest portion of the seed; leaves with 3 basal lobes .....[*C. opulifolium*, a waif]
19. Perianth lobes not united or united only at the base; leaves dentate serrate .....(20)
20. Sepals spreading, not closed over the seed; leaves serrate; seeds oval in outline .....14. *C. strictum*
20. Sepals closed over the seed; leaves dentate and lobed; seeds round in outline .....(21)
21. Pericarp alveolate-reticulate or reticulate .....15. *C. berlandieri*
21. Pericarp smooth or mottled .....16. *C. album*





1. *Chenopodium multifidum* L.

Common Name: Cut-leaf Goosefoot

Type Description: Linnaeus, Species Pl. I, p. 220, 1753

Synonym: *Roubieva multifida* (L.) Moq.

Origin: A native of South America

Habitats: Waste ground and ballast dumps

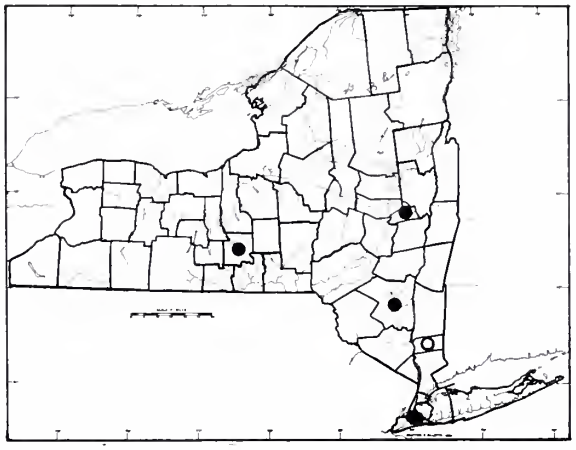
Habit: Prostrate to ascending perennial herbs

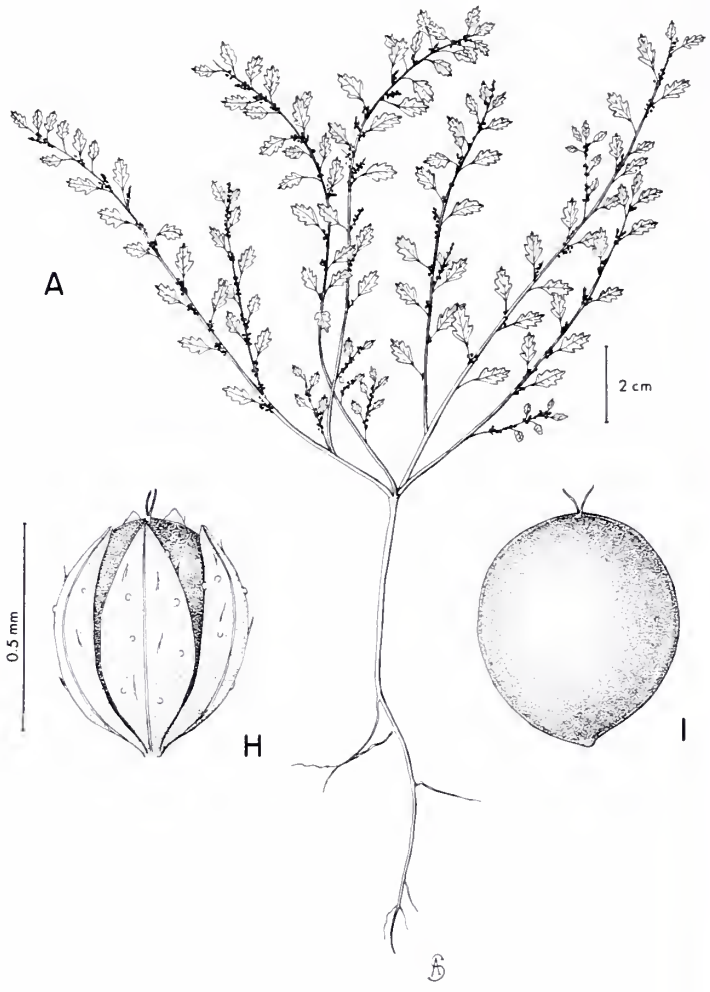
Flowering: July-October

Fruiting: July-October

General Distribution: Brazil to Argentina and Chile; adventive in North America, near the coast, from New York to Florida and from Oregon to California

Description: Plants with **bisexual** flowers; **stigmas** 2 (-5), erect or spreading, 0.3-0.4 mm long; **style** 0.1-0.2 mm long; **ovary** ovoid to oblong; **fruit** obovoid, the pericarp membranaceous with many yellow, glandular hairs near the apex, smooth, loosely adherent; **seed** vertical, dark reddish-brown, suborbicular to ovoid, 0.8-1.1 mm long, 0.8-0.9 mm broad, testa smooth; **stamens** 5; **filaments** membranaceous, 0.7-0.9 mm long; **anthers** ellipsoid, yellow, 0.4-0.5 mm long; **perianth** urceolate, shallowly 5-lobed, 1.5-2.0 mm long, 1.1-1.3 mm broad in fruit, obovoid, reticulate-nerved, puberulent; **lobes** 0.1-0.5 mm long, 0.6-0.8 mm broad, rounded, accrescent and coriaceous with age; **bracts** and **bracteoles** absent; **inflorescence** of glomerules in the axils of leaves; **glomerules** subglobose, 1.8-2.5 mm in diameter; **leaves** oblong, deeply pinnatifid, 1.0-4.5 cm long, 0.2-2.0 cm wide, or the upper smaller segments oblong, apex acute to obtuse, entire or dentate; **petioles** absent; **stems** much-branched, the branches prostrate or ascending, 1.5-7.0 dm long, striate, white villous when young, sometimes glabrate with age; **root system** annual with a taproot.





2. *Chenopodium pumilio* R.Br.

Common Name: Goosefoot

Type Description: R. Brown, Prodr. 1: 407, 1810

Synonym: *C. carinatum, sensu* American authors, not R. Br.

Origin: Native to Australia

Habitats: Waste areas on rocky, sandy, or gravelly ground and sidewalk crevices

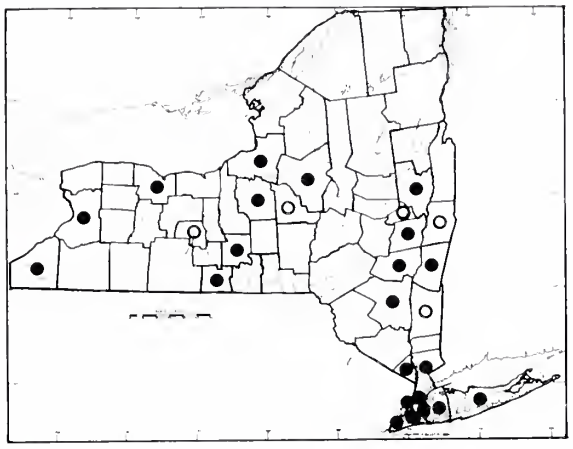
Habit: Erect, annual herbs

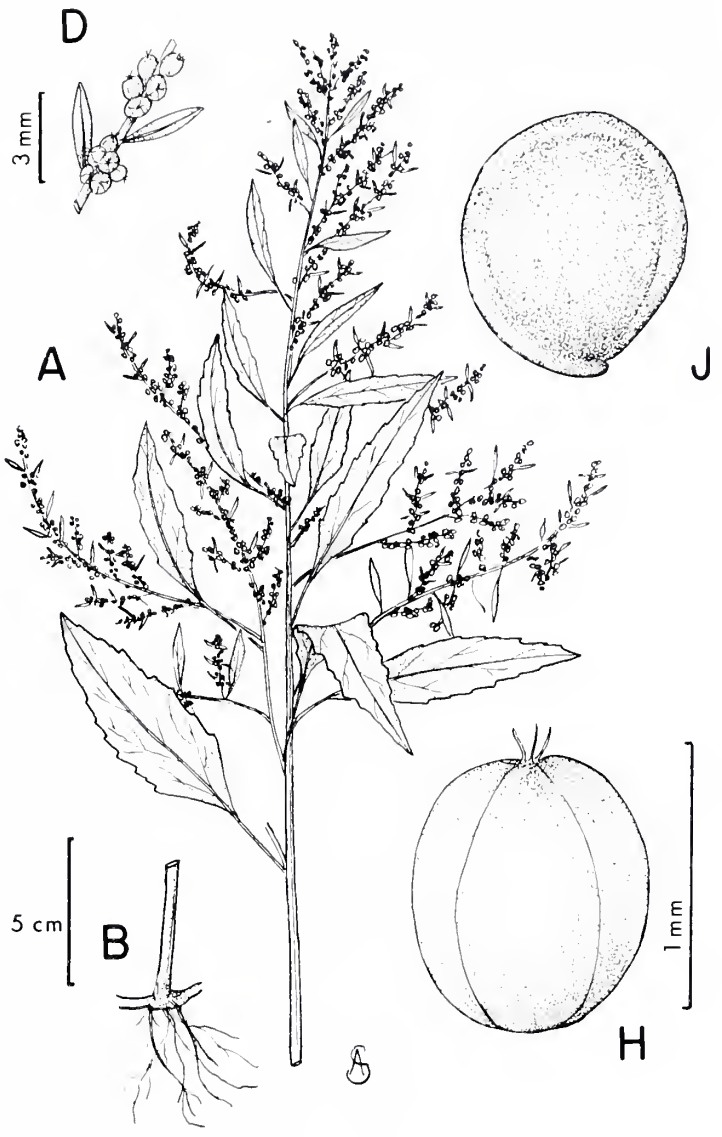
Flowering: June-September

Fruiting: August-October

General Distribution: Australia: introduced in North America from Massachusetts south to Washington D.C., and from Missouri to Texas and California

Description: Plants with **bisexual** flowers; **stigmas** 3, erect or spreading, 0.1-0.3 mm long; **style** absent; **ovary** ovoid; **fruit** ovoid, the pericarp membranaceous, slightly rugose, adherent; **seed** vertical, reddish brown, ovoid, 0.6-0.7 mm long, 0.5-0.6 mm broad, testa smooth; **stamens** 0 or 1; **filaments** membranaceous, 0.3-0.4 mm long; **anthers** globose, yellow, 0.2-0.3 mm long; **perianth** 5-lobed; **lobes** elliptic to oblong, 0.6-0.7 mm long, 0.2-0.3 mm broad, usually cucullate or carinate, apex acute, usually covered with glands, partially enclosing the seed, united only at the base; **bract** 3-16 mm long, 0.4-6.0 mm broad, elliptic, apex obtuse, margin crenate dentate, petiolate; **bracteoles** absent; **inflorescences** of axillary glomerules or axillary cymes; **glomerules** subglobose, 1.5-2.5 mm in diameter; **leaves** oblong to ovate-oblong, 1.4-2.7 cm long, 0.6-1.5 cm broad, reduced somewhat in the inflorescence, yellow-green with yellow glands, the apex obtuse, base cuneate, margins coarsely sinuate-dentate with obtuse lobes; **petioles** 0.3-1.5 cm long; **stems** much-branched from the base, the branches stout, prostrate or 2-4 dm tall, whitish, glandular villous throughout; **root system** annual with a taproot.





3. *Chenopodium ambrosioides* L.

Common Names: Mexican Tea, Spanish Tea, Wormseed

Type Description: Linnaeus, Species Pl. I, p. 219, 1753

Synonyms: *Chenopodium ambrosioides* var. *anthelminicum* (L.) A. Gray, *C. ambrosioides* var. *chilense* of New York authors not (Schrad.) Speg., *C. anthelminicum* L.

Origin: A native of tropical America

Habitats: Disturbed areas as a weed

Habit: Erect or ascending, annual or short-lived, perennial herbs

Flowering: August-October

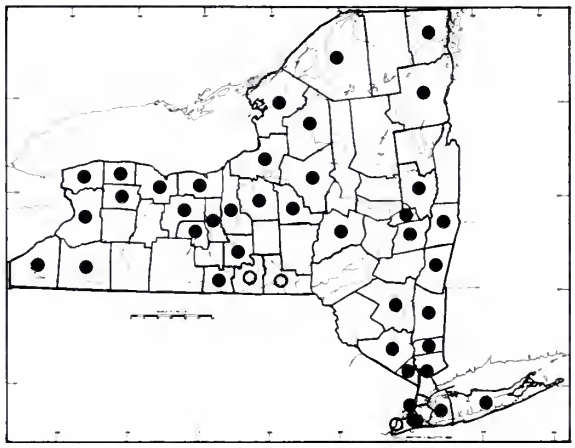
Fruiting: August-November

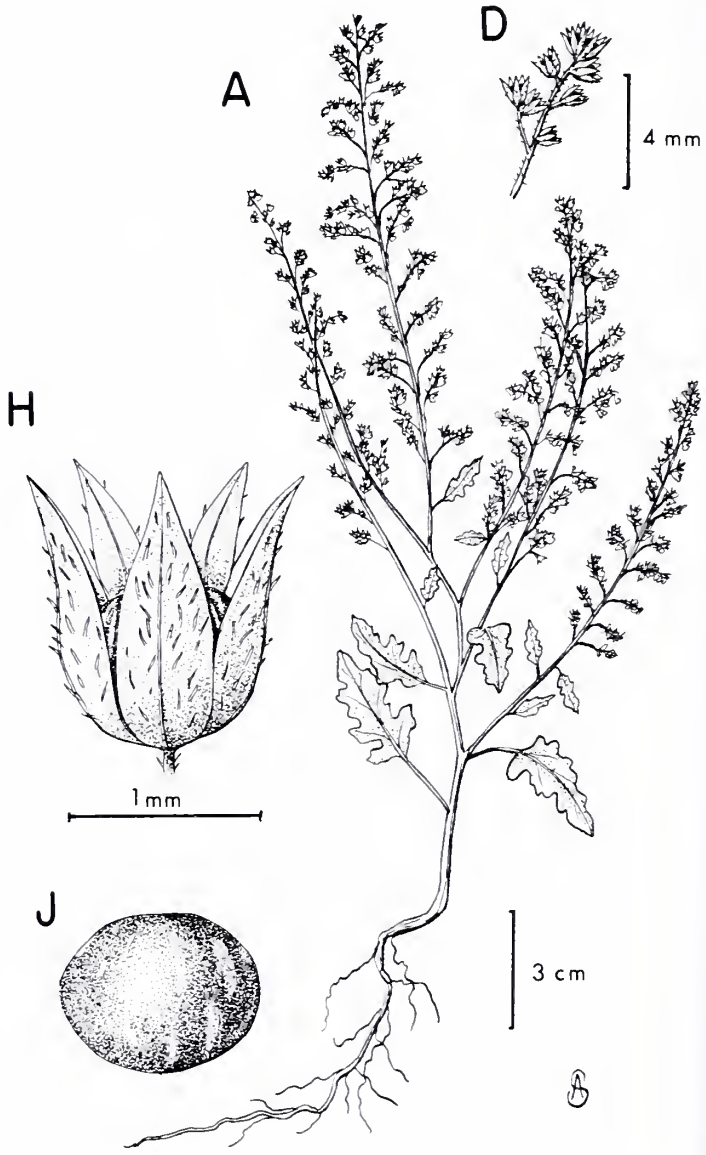
General Distribution: Maine to southern Ontario, south to Central America; also introduced in Europe, Asia and Africa

Description: Plants with **bisexual** flowers; **stigmas** 3, erect or spreading, 0.2-0.4 mm long; **style** absent; **ovary** ovoid; **fruit** ovoid, the pericarp rugose to smooth, non-adherent; **seed** horizontal or vertical, reddish-brown, ovoid, 0.6-1.0 mm in diameter, 0.4-0.5 mm thick, testa rugose to smooth; **stamens** 4-5; **filaments** membranaceous, 0.5-0.7 mm long; **anthers** globose, yellow, 0.3-0.4 mm long; **perianth** 4-5 lobed; **lobes** ovate, 0.7-1.0 mm long, 0.4-0.5 mm broad, obtuse on back, apex obtuse, upper half free, covering the seed at maturity; **bract** lanceolate, oblanceolate, spatulate or linear, the apex obtuse, acute or attenuate, 0.3-2.5 cm long, 0.5-7.0 mm broad; **bracteoles** absent; **inflorescences** lateral leafy-bracted or naked spikes, 3-7 cm long; **leaves** with the smell of kerosene, ovate to oblong-lanceolate, the lower ones mostly lanceolate, 2-8 (-12) cm long, 0.5-4.0 (-5.5) cm wide, entire, dentate or laciniate, apex obtuse to attenuate, base cuneate, copiously glandular-punctate (glands rarely lacking); **petioles** on lower leaves to ca. 18 mm long, upper leaves sessile; **stems** erect to ascending, much-branched, 3-10 dm tall, more or less glandular-pubescent, strongly aromatic; **root system** annual with a taproot (2n = 16, 32, 36, 48?, 64).

Infraspecific Variation: This is a highly variable species or group of species. In New York State, two morphological variants occur: plants with leafy bracts interrupting the inflorescence (typical *C. ambrosioides*), and plants without bracts, "*C. anthelminicum*." According to Woroschilov (1942) typical *C. ambrosioides* takes 60-75 days to mature, while *C. anthelminicum* takes 145 days. There are, however, many apparent morphological intermediates, and the taxonomy of the group has not been resolved. It is treated here as a single, polymorphic species.

Importance: *Chenopodium ambrosioides* has been used as medicine to treat numerous ailments. Perhaps the most important use has been as a vermifuge (particularly for roundworms). The active ingredient is the volatile oil, Ascaridol, which has proven very effective, but its serious overdose side-effects have sometimes lead to death. Loss of human life from ingesting leaves or seeds, however, has not been reported. *Chenopodium* extract has also been used as a fever-reducing stomatic, an expectorant, treatment to soothe menstrual cramps, and it has been administered in larger doses to induce fetal abortion. The leaves have been used to make a weak tea, and the extract serves as a food flavoring in Mexico. The essential oil is allelopathic to many other plants, including vegetables, so, in Mexico, it is often grown in a secluded corner of the garden.





4. *Chenopodium botrys* L.

Common Names: Jerusalem-oak, Feather-geranium

Type Description: Linnaeus, Species Pl. I, p. 219, 1753

Origin: A native of Europe

Habitats: Waste places and sandy shores, occasionally a weed along roads and in waste areas

Habit: An erect, annual, herb

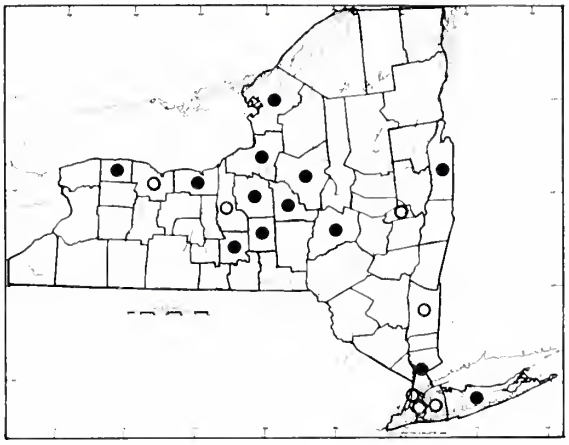
Flowering: July-September

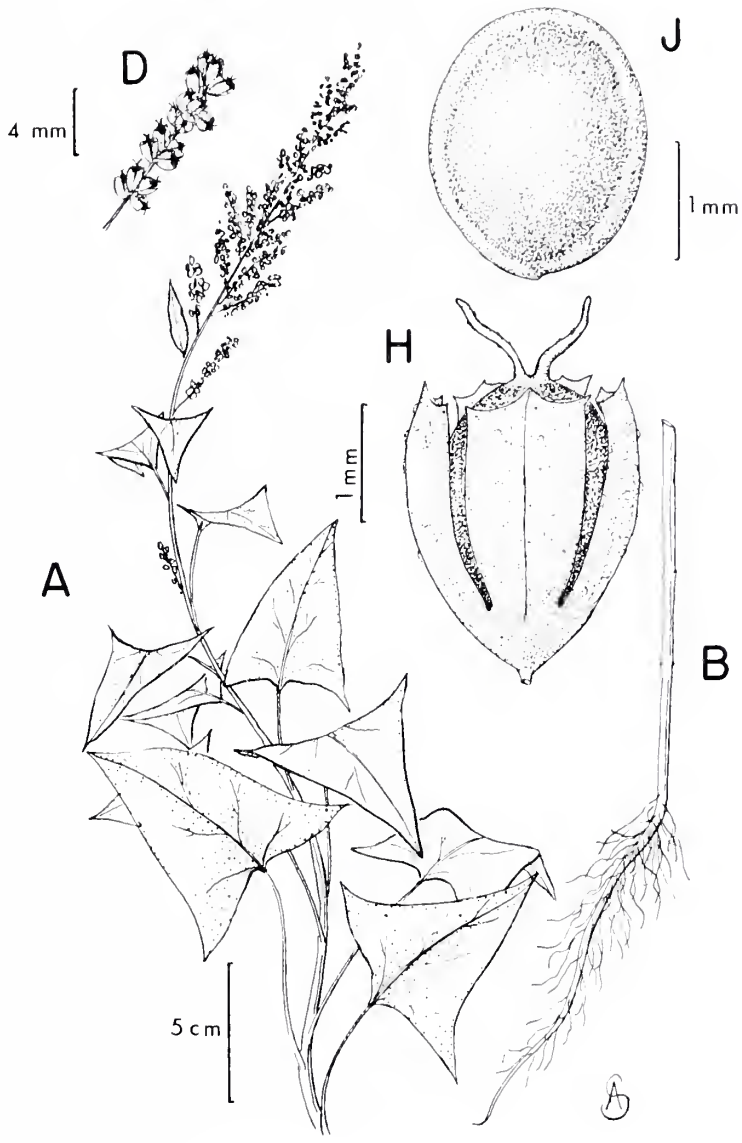
Fruiting: August-October

General Distribution: Europe and Asia; naturalized in North America from Quebec to the Northwest Territories and south to California, Missouri and Virginia

Description: Plants with **bisexual** flowers; **stigmas** 2, erect, 0.2-0.5 mm long; **style** absent; **ovary** ovoid; **fruit** depressed-ovoid, the pericarp membranaceous, rugose, usually with translucent, whitish stripes, adherent; **seed** usually horizontal, black, ovoid-globose, 0.6-0.8 mm broad, 0.5-0.6 mm thick, testa rugose; **stamens** 5; **filaments** membranaceous, 0.7-0.8 mm long; **anthers** globose, yellow, 0.2-0.3 mm long; **perianth** 5-lobed; **lobes** elliptic, ovate to oblong, 0.7-0.9 mm long, 0.5-0.6 mm broad, obtuse on the abaxial surface, apex acute to obtuse, densely glandular-pubescent abaxially, lobes covering the seed at maturity, united only at the base; **bract** and **bracteoles** absent; **inflorescence** of terminal, compound cymes, (9-) 17-23 cm long; **glomerules** absent; **leaves** lanceolate to narrowly elliptic, ovate, 1.5-4.0 cm long, 0.6-2.7 cm broad, upper leaves much smaller, margins sinuate, pinnatifid, occasionally entire; **petioles** 0-2.5 mm long; **stems** erect, branched, 9-47 (-60) cm tall, covered with short-stalked, glandular hairs, slightly aromatic; **root system** annual with a taproot (2n = 18).

Importance: Pollen of this species has been cited as a cause of hay fever. In France, the extract has been used as an expectorant.





5. *Chenopodium bonus-henricus* L.

Common Name: Good-King-Henry

Type Description: Linnaeus, Species Pl. 1, p. 218, 1753

Origin: A native of Europe

Habitats: Waste places and cultivated ground

Habit: An erect, perennial herb

Flowering: June-August

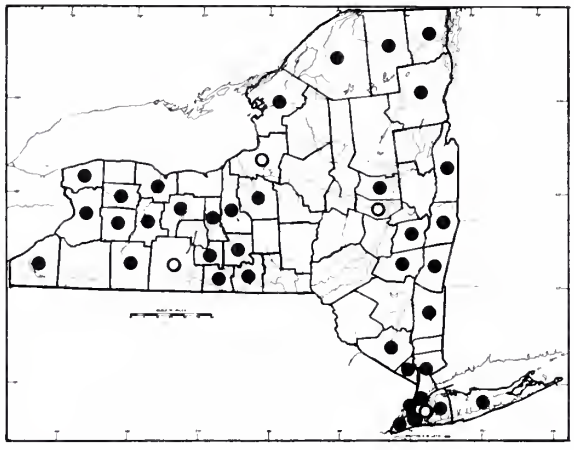
Fruiting: June-October

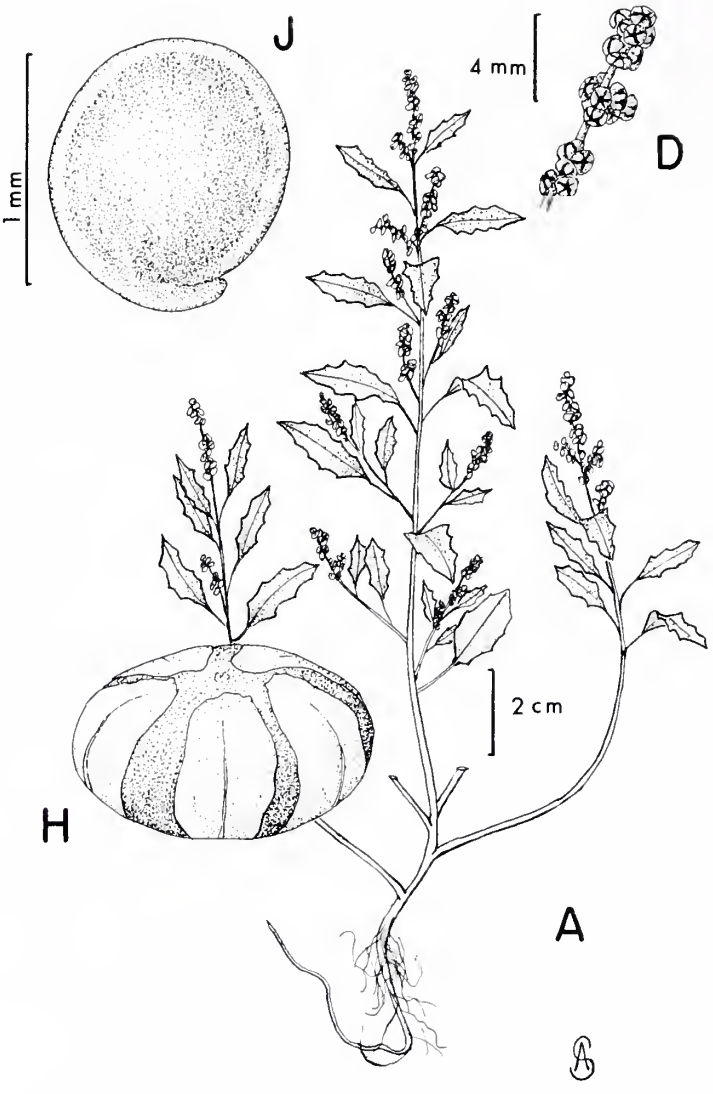
General Distribution: Adventive from Europe; in North America: from Nova Scotia to Alberta south to Illinois and New York

Description: Plants with **bisexual** flowers; **stigmas** 2, spreading, 0.6-1.2 (-1.5) mm long; **style** absent; **ovary** ovoid or obovoid; **fruit** obovoid, pericarp membranaceous, more or less smooth, adherent; **seed** vertical, reddish-brown, obovoid, 1.5-1.7 mm long, 1.4-1.6 mm wide, testa rugose; **stamens** 5; **filaments** 0.5-0.6 mm long, membranaceous; **anthers** ellipsoid, yellow, 0.4-0.6 mm long; **perianth** 4-5 lobed; **lobes** oblong, 1.0-1.5 mm long, ca. 1 mm broad, scarcely abaxially keeled, apex obtuse to rounded, not covering the seed at maturity, glabrous, united into a tube 0.4-0.6 mm long; **bract** ovate to lanceolate, 1-5 cm long, 1.2-4.0 cm broad, apex acuminate, base cuneate; **bracteoles** absent; **inflorescence** mostly terminal, compound spike, 5-13 cm tall, 4-10 cm broad; **leaves** broadly hastate to triangulate, 4.5-10.0 cm long, 3-7 cm broad, apex acute, entire, except for the basal lobes; **petioles** 1-10 cm long; **stems** erect to ascending, branched, 2.5-5.0 (-7) dm tall, somewhat viscid and farinose; **perennial**, with a thick, woody root system (2n = 36).

Importance: This plant has, occasionally, been cultivated for its leaves, which are used like spinach. It is gently laxative and has been used as a remedy for indigestion.

Note: The specific epithet "*bonus-henricus*" was not intended to refer to King Henry but, instead, to distinguish this plant from "*malus Henricus*" or 'bad-Henry' (*Mercurialis annua* L.). The name Henry in this case is said to refer to elves and kobolds ('Heinz' and 'Heinrich').





6. *Chenopodium glaucum* L.

Common Name: Oak-leaf Goosefoot

Type Description: Linnaeus, Species Pl. I, p. 220, 1753

Synonyms: *C. salinum* Standl., *C. glaucum* ssp. *salinum* (Standl.) Aellen

Origin: A native of Europe

Habitats: Waste places, especially soils that are more or less brackish

Habit: Erect, annual, herbs

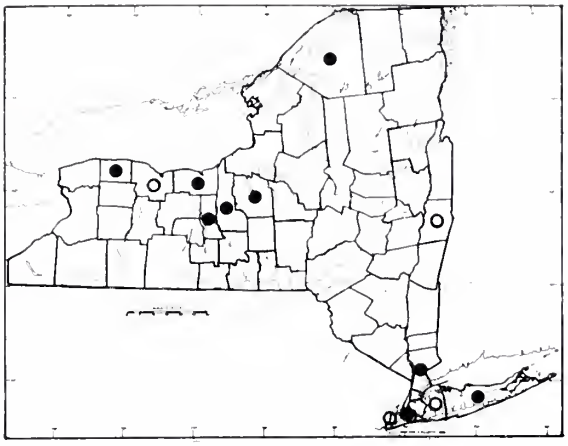
Flowering: July-August

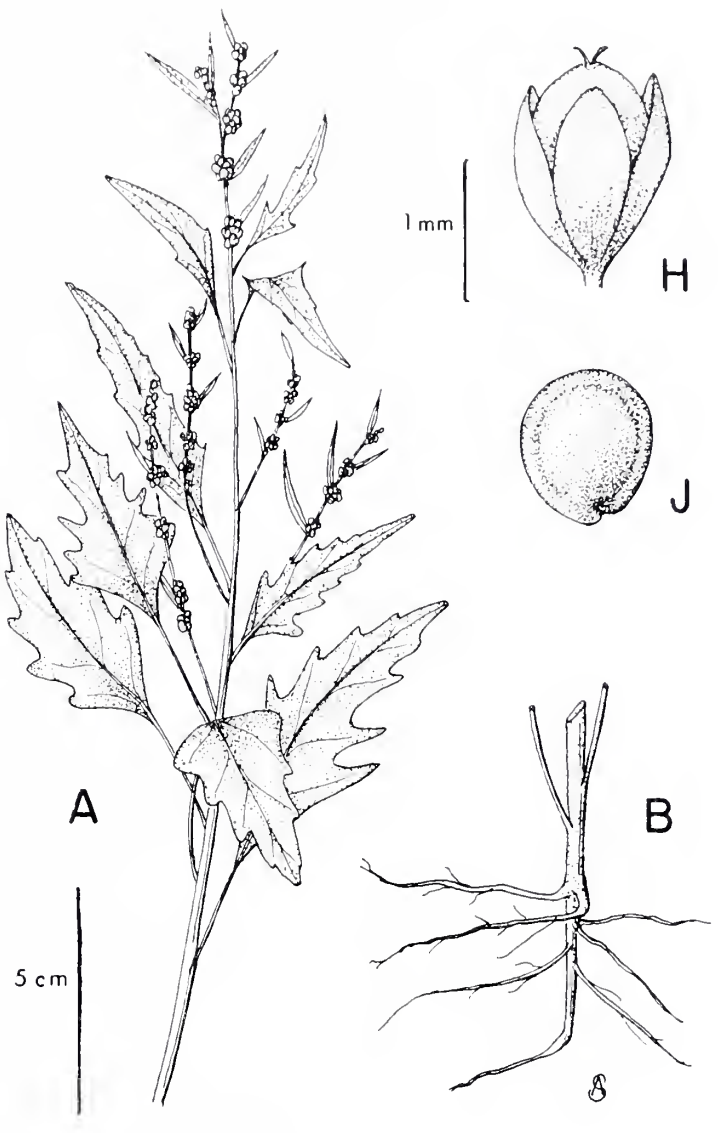
Fruiting: August-September

General Distribution: Nova Scotia west to the Northwest Territories, south to California, Missouri and Virginia

Description: Plants with **bisexual** flowers; **stigmas** 2, spreading, 0.1-0.2 mm long; **style** absent; **ovary** depressed-ovoid; **fruit** ovoid or round in outline, the pericarp membranaceous, smooth, non-adherent; **seed** usually horizontal, but occasionally vertical, reddish brown, vertical seeds ovoid to round in outline, 0.6-0.9 mm in diameter, 0.2-0.3 mm thick, horizontal seeds lentieular, round, 0.7-0.9 mm in diameter, 0.4-0.5 mm thick, testa rugose-punctate; **stamens** 5; **filaments** membranaceous, 0.4-0.5 mm long; **anthers** globose, yellow, 0.2-0.3 mm long; **perianth** 3-5 lobed; **lobes** obovate to oblong, ca. 0.5 mm long, 0.4-0.5 mm broad, obtuse abaxially, apex obtuse, covering the seed at maturity, fused at base; **bract** and **bracteoles** absent; **inflorescence** of axillary or terminal spikes, 5-10 cm tall, the flowers at each node in glomerules; **glomerules** subglobose, 1.8-2.5 mm in diameter; **leaves** lanceolate to oblong or ovate, 0.5-4.0 cm long, 0.3-1.5 cm broad, apex obtuse, base cuneate, margins undulate dentate, teeth obtuse, densely white mealy beneath; **petioles** 0-1 cm long; **stems** erect to prostrate, branched from the base, 0.5-2.5 (-4) dm tall, striate; **annual** with a taproot (2n = 18).

Infraspecific Variation: Material with acute lobed and acute leaf apices and mostly with bracts subtending the flowers have been separated as *C. glaucum* var. *salinum* which is more common in western United States.





7. *Chenopodium rubrum* L.

Common Names: Red pigweed, Red Goosefoot, Coast-blite

Type Description: Linnaeus, Species Pl. 1, p. 218, 1753

Synonyms: *Chenopodium chenopodioides* (L.) Aellen, *C. humile* Hook., *C. rubrum* var. *humile* (Hook.) S. Wats.

Origin: Uncertain, possibly native to both North America and Eurasia

Habitats: Salt marshes

Habit: Erect or spreading, annual herbs

Flowering: August-September

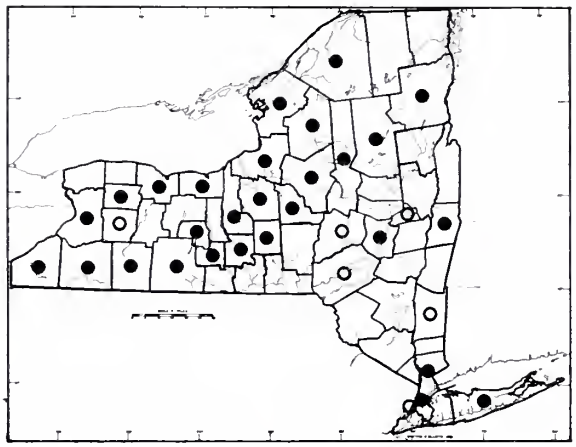
Fruiting: August-October

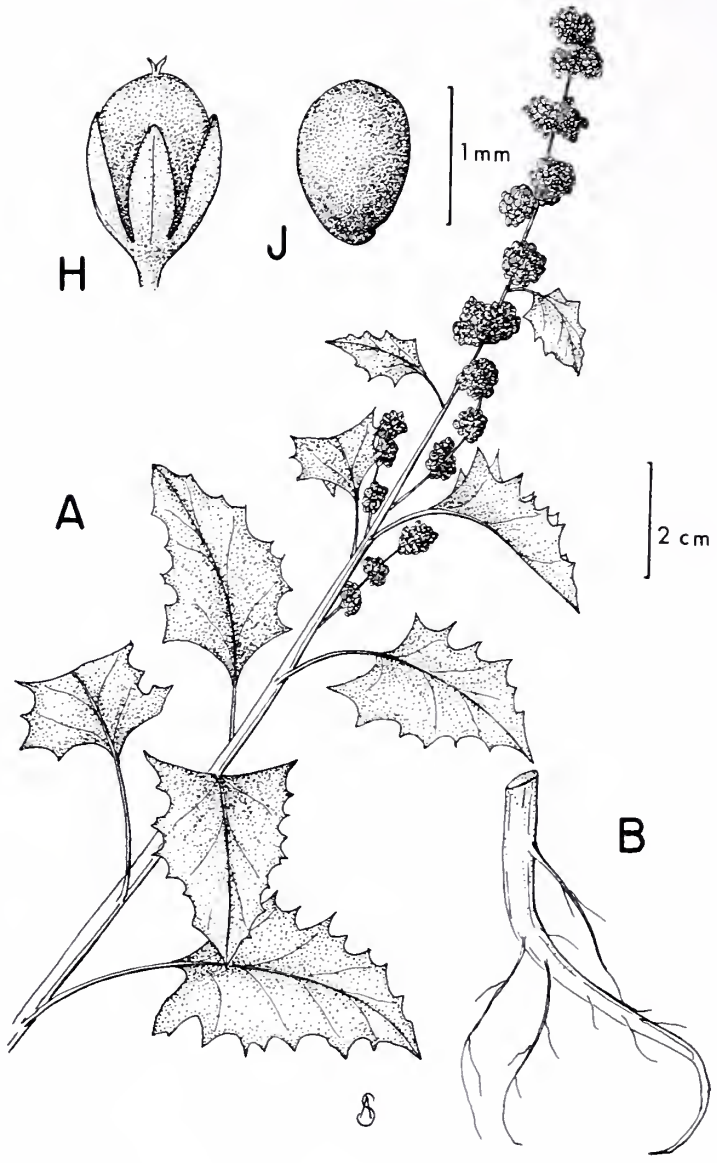
General Distribution: Eurasia; in North America from Nova Scotia to Alaska south to California, Missouri and New Jersey

Rarity Status: *Chenopodium rubrum* is ranked G5 S1 by the New York Natural Heritage Program.

Description: Plants with **bisexual** flowers; **stigmas** 2, erect or spreading, 0.1-0.2 mm long; **style** ca. 0.1 mm long or absent; **ovary** ovoid; **fruit** ovoid, pericarp membranaceous, smooth, non-adherent; **seed** vertical or occasionally horizontal, reddish-brown, ovoid, 0.7-1.0 (-1.2) mm high, 0.6-0.8 mm broad, testa reticulate-punctate; **stamens** 5; **filaments** membranaceous, 0.3-0.5 mm long; **anthers** globose, yellow, 0.2-0.4 mm long; **perianth** 5-lobed; **lobes** lanceolate to elliptic, 0.9-1.0 mm long, 1.0-1.2 mm broad, rounded or occasionally keeled on back, apex obtuse to rounded, glabrous, covering the seed at maturity, united only at the base; **bracts** linear, 4-20 mm long, 0.2-1.5 mm broad; **bracteoles** absent; **inflorescence** of axillary glomerules; **glomerules** subglobose, 2-5 mm diameter; **leaves** triangular to rhomboid, 1-9 cm long, 1-6 cm broad, green, tinged with red or purple, especially at bases, fleshy, apex obtuse to acute, base cuneate, margins with a few large, obtuse teeth on each side, rarely entire; **petioles** 0.5-4.5 mm long; **stems** erect to ascending, rarely decumbent, angular, glabrous, much-branched, 3-6 (-8) dm tall; **root system** annual, with a taproot ($2n = 18$).

Infraspecific Variation: This is a highly variable species worldwide. Smaller, often prostrate plants with nearly entire leaves have been called *C. humile* Hook. *Chenopodium chenopodioides* plants have 3-4 sepals (vs. usually 3 sepals in typical *C. rubrum*) in the flowers with vertical seeds, and sepals united nearly to the tip. Bassett and Crompton (1982) concluded that *C. chenopodioides* and *C. humile* were ecological variants of *C. rubrum*, their treatment is followed here.





8. *Chenopodium capitatum* (L.) Aschers.

Common Names: Strawberry-blight, Indian-paint

Type Description: Linnaeus, Species Pl., I, p. 4, 1753

Synonym: *Blitum capitatum* L.

Origin: Native to Eurasia

Habitats: Dry soil, chiefly in thickets, open woods and in old fields or clearings in forest

Habit: Erect, annual herb

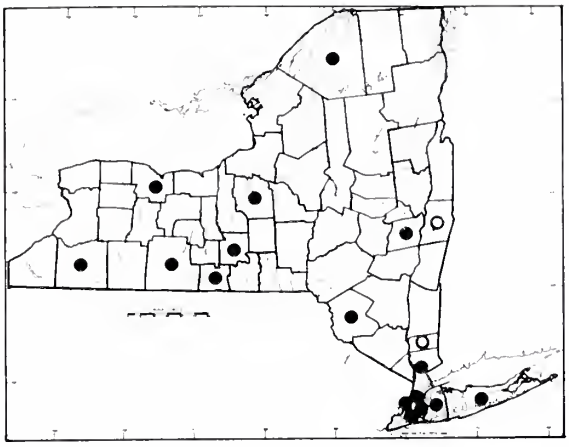
Flowering: June-September

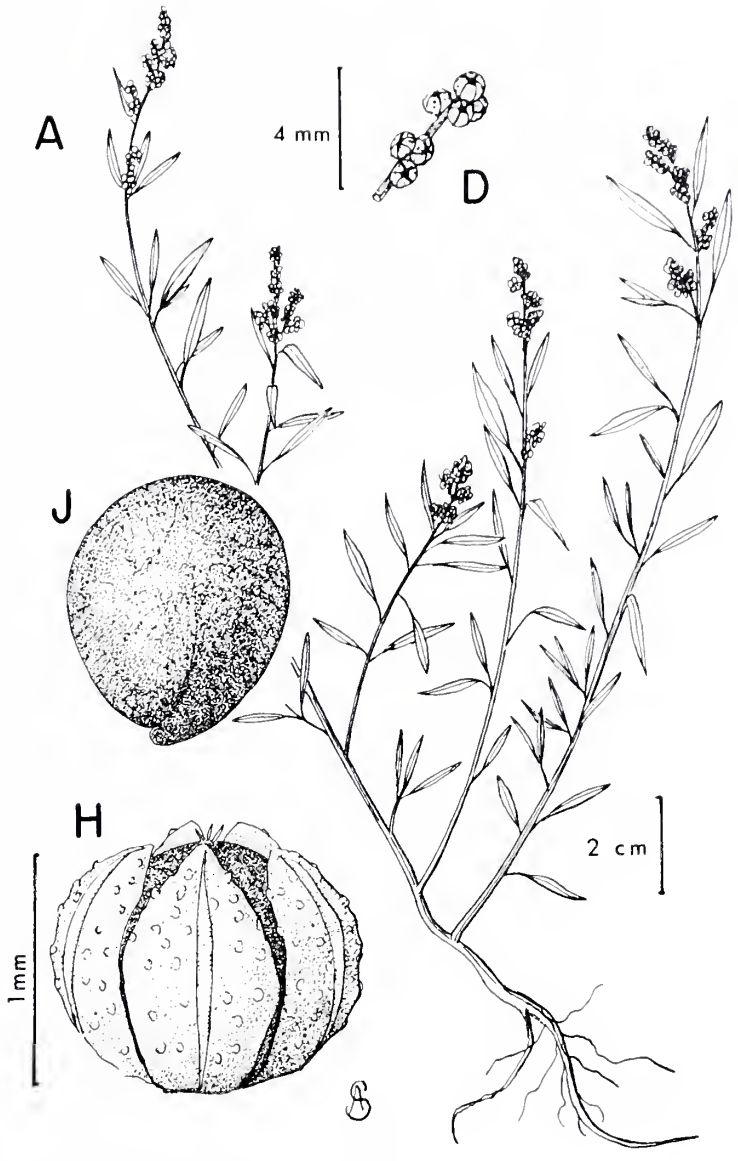
Fruiting: June-September

General Distribution: Eurasia; in North America from Nova Scotia to Alaska south to California, Missouri and New Jersey

Description: Plants with **bisexual** flowers; **stigmas** 2, erect or spreading, 0.2-0.4 mm long; **style** 0.1-0.2 mm long; **ovary** ovoid; **fruit** ovoid, pericarp membranaceous, smooth, adherent; **seed** vertical, black, lenticular, 0.6-0.9 mm broad, 0.7-1.2 mm high, testa reticulate-punctate; **stamens** 3; **filaments** membranaceous, ca. 0.5 mm long; **anthers** globose, light yellow, ca. 0.2 mm long; **perianth** 3-lobed; **lobes** ovate, 0.6-0.7 mm long, 0.4-0.5 mm broad, not keeled, apex acute, becoming deep red and fleshy, covering the seed at maturity, united at the base; **bract** and **bracteoles** absent; **inflorescence** terminal spikes 5-10 cm tall, the flowers in glomerules at the nodes; **glomerules** globose, 5-12 mm in diameter; **leaves** triangular to triangular-hastate, 2.5-10.0 cm long, 1-9 cm broad, apex acute, base truncate, margins sharply dentate or occasionally entire, green on both surfaces, rather fleshy; **petioles** 1.5-10.0 cm long; **stems** erect to ascending, branched from the base, 1.5-7.5 dm tall, glabrous, green, stems angular; **root system** annual with a short taproot (2n = 18).

Importance: The fleshy fruits are sometimes eaten raw or cooked, and the leaves are sometimes cooked as a spinach substitute. The red fruits have been used to color wine and as a rouge.





9. *Chenopodium pratericola* Rydb.

Common Name: Narrowleaf Goosefoot

Type Description: Rydberg, Bull. Torrey Bot. Club, vol. 39, p. 310, 1912

Synonyms: *Chenopodium dessicatum* A. Nels, *C. dessicatum* var. *leptophylloides* (Murr) Wahl., *C. foggii* Wahl, *C. leptophyllum* Nutt. ex Moq. in DC, not S. Wats., *C. pratericola* var. *leptophylloides* (Murr) Aellen & Just

Origin: A native of the western United States

Habitats: Sea beaches, sandy or brackish soils and railroad rights-of-way

Habit: Erect, annual herbs

Flowering: June-August

Fruiting: August-October

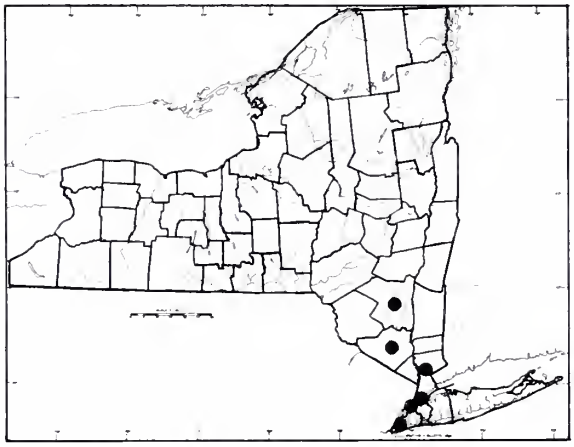
General Distribution: Maine to the Northwest Territories, south to Mexico, Louisiana and North Carolina

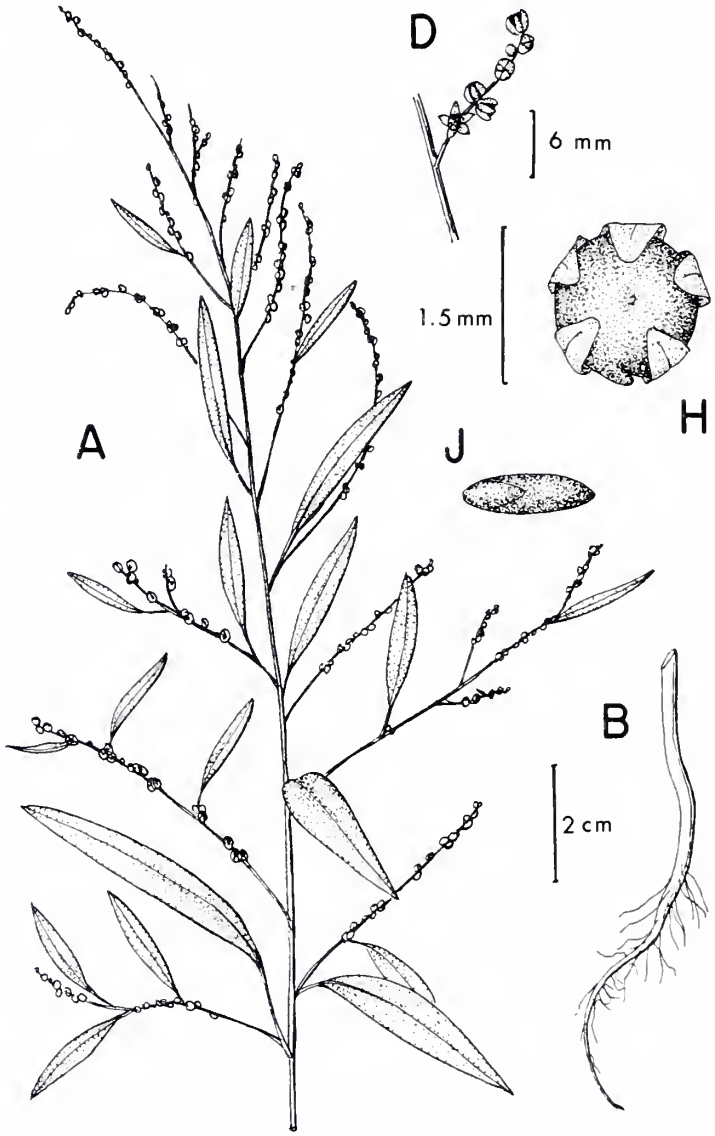
Description: Plants with **bisexual** flowers; **stigmas** 2, erect, 0.2-0.3 mm long; **style** ca. 0.1 mm long; **ovary** depressed-ovoid; **fruit** depressed-ovoid, the pericarp membranaceous, smooth, non-adherent; **seed** horizontal, black, lenticular, ovoid, 1.0-1.4 mm broad, 0.5-0.8 mm thick, testa verrucate; **stamens** 4-5; **filaments** membranaceous, 0.4-0.7 mm long; **anthers** globose, yellow, 0.2-0.3 mm long; **perianth** 4-5 lobed; **lobes** lanceolate, 0.8-1.0 mm long, 0.5-0.7 mm broad, keeled along the midvein, apex acute, densely farinose, often obscuring the seed at maturity, united at the base; **bract** linear, up to 5 mm long, or absent; **inflorescences** of terminal and axillary spikes, 1-5 cm tall, 1.5-3.5 mm broad; **glomerules** subglobose, 1.5-3.5 mm in diameter; **leaves** 3-veined, fleshy, linear, narrowly lanceolate, oblong-elliptic, or ovate-lanceolate, 1-3 cm long, 0.5-1.0 mm broad, apex acute, base cuneate, margins entire, lower surfaces densely white-mealy; **petioles** 4-10 mm long; **stems** erect to spreading, unbranched or branched from the base, 15-45 cm tall, densely farinose; **root system** annual with a taproot (2n = 18).

Note: Most New York State collections of this species are from sea beaches on Long Island. In these locations the plant is found in association with a number of indisputably native plants, including *Amaranthus pumilus* Raf. and *Atriplex arenaria* Nutt. Most authors have considered the eastern U.S. populations to be introductions but this might need to be reconsidered.

Infraspecific Variation: This is a highly variable species, whose western members have been studied by Crawford and collaborators. They recognized *C. dessicatum* as distinct from *C. pratericola* on the basis of habit and enclosure versus exposure of the mature fruit by the calyx lobes. In New York State, there are specimens that fit both species (as defined by Crawford *et al.*), but there are also apparent intermediates in one or both characteristics. *Chenopodium dessicatum* and *C. pratericola* of New York are

here treated as a single, variable species; the habit illustration depicts a plant that would fit within the morphological limits of *C. dessicatum* if both species were recognized. *Chenopodium foggii* Wahl has been reported from New York by Wahl (1954). It usually grows in relatively natural, partially shaded habitats under hardwood trees or shrubs, and this may account for the more "leggy" habit described for it. I have seen only a few sheets determined by Wahl, and these are not sufficient to prompt a suggestion as to the appropriate status of the taxon. In addition, there is confusion in the literature. Whereas, Wahl states that the pericarp of *C. foggii* is markedly separable, Bassett & Crompton (1982) say that the pericarp is adherent (an important character in their key). While the identity and relationships of *C. foggii* await further research, I am, tentatively, placing the name in synonymy under *C. pratericola*.





10. *Chenopodium standleyanum* Aellen

Common Names: Goosefoot, Standley's Goosefoot

Type Description: Aellen, Feddes Repert. Sp. Nov. Regni Veg., vol. 26, p. 153, 1929

Synonyms: *Chenopodium album* var. *boscianum* (Moq.) A. Gray; *C. boscianum* Moq. in part; *C. polyspermum* var. *spicatum* A. Gray

Origin: Native to eastern North America

Habitats: Shaded, wooded areas, often in disturbed soils

Habit: Erect, annual herbs

Flowering: August-September

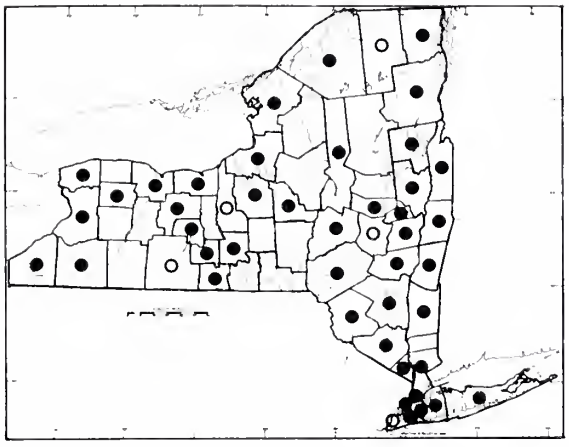
Fruiting: September

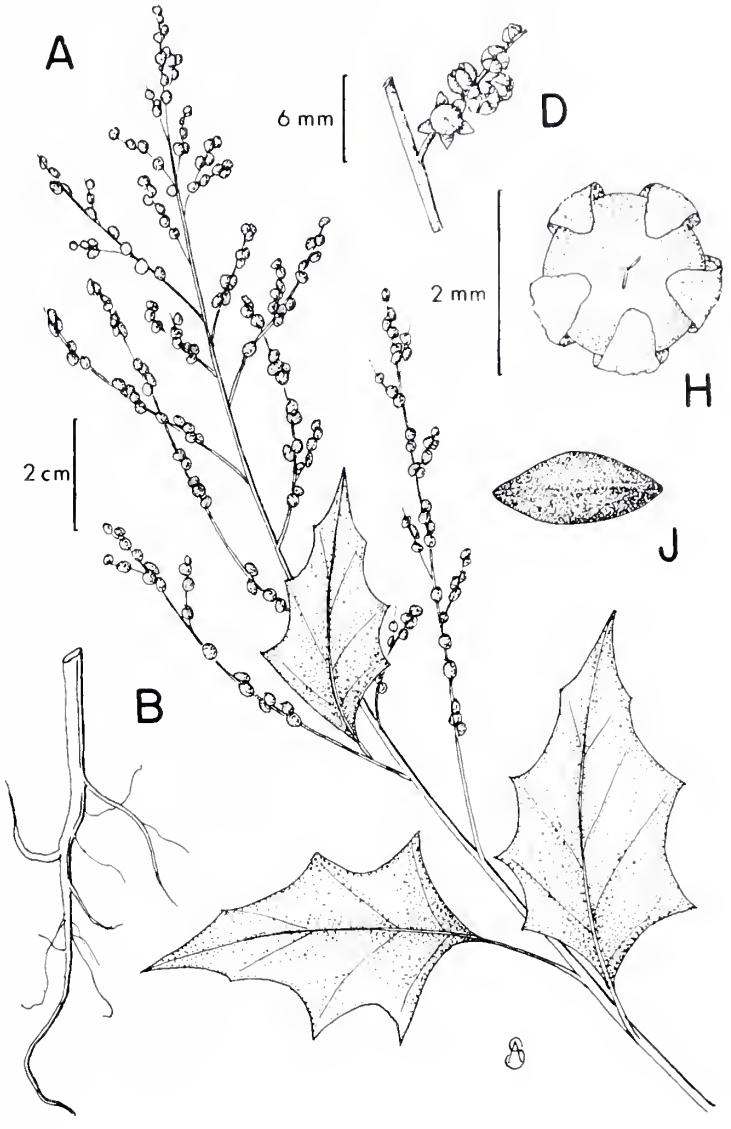
General Distribution: New York and Ontario to South Dakota, south to Texas and Florida

Rarity Status: This species is ranked G5 SH by the New York Natural Heritage Program.

Description: Plants with **bisexual** flowers; **stigmas** 2, erect or spreading, 0.1-0.2 mm long; **style** absent; **ovary** depressed-ovoid; **fruit** depressed-ovoid, pericarp membranaceous, smooth, non-adherent; **seed** horizontal, ovoid, black, lenticular, 0.9-1.3 mm in diameter, 0.6-0.8 mm thick, testa reticulate-alveolate to smooth; **stamens** 5; **filaments** membranaceous, ca. 0.3 mm long; **anthers** globose, yellow, ca. 0.1 mm long; **perianth** 5-lobed; **lobes** obovoid, 0.5-0.7 mm long, 0.5-0.7 mm broad, faintly (or not at all) abaxially keeled, apex rounded, scarcely farinose, partially covering the seed at maturity; **bract** and **bracteoles** absent; **inflorescences** terminal and axillary, flexuous spikes and panicles, 6-15 cm long, the flowers in small, widely spaced glomerules; **glomerules** irregularly globose, 0.5-2.0 mm in diameter, the flowers within them differing in stages of development; **leaves**

oblong-ovoid to lanceolate, 2.0-4.5 cm long, 0.5-1.5 cm broad, apex acute to acuminate, base cuneate, margins entire, or with a few teeth toward the base; **petioles** 5-25 mm long; **stems** erect, branched, 20-60 cm tall, angular, glabrous; **root system** annual with a taproot (2n = 18).





11. *Chenopodium simplex* (Torr.) Raf.

Common Name: Maple-leaf Goosefoot

Type Description: Torrey, Ann. Lyceum Nat. Hist. New York, vol. 2, p. 239, 1827

Synonyms: *Chenopodium gigantospermum* Aellen, *C. hybridum* L. var. *gigantospermum* (Aellen) Rouleau, *C. hybridum* var. *simplex* Torr.

Origin: Native to eastern North America

Habitats: Woods and thickets, sometimes in waste places and in fields

Habit: Erect, annual herbs

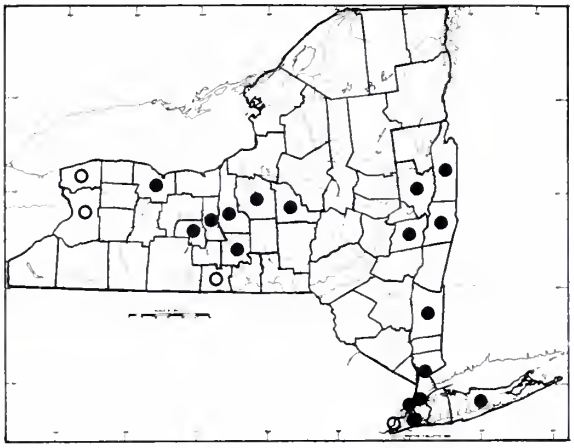
Flowering: July-October

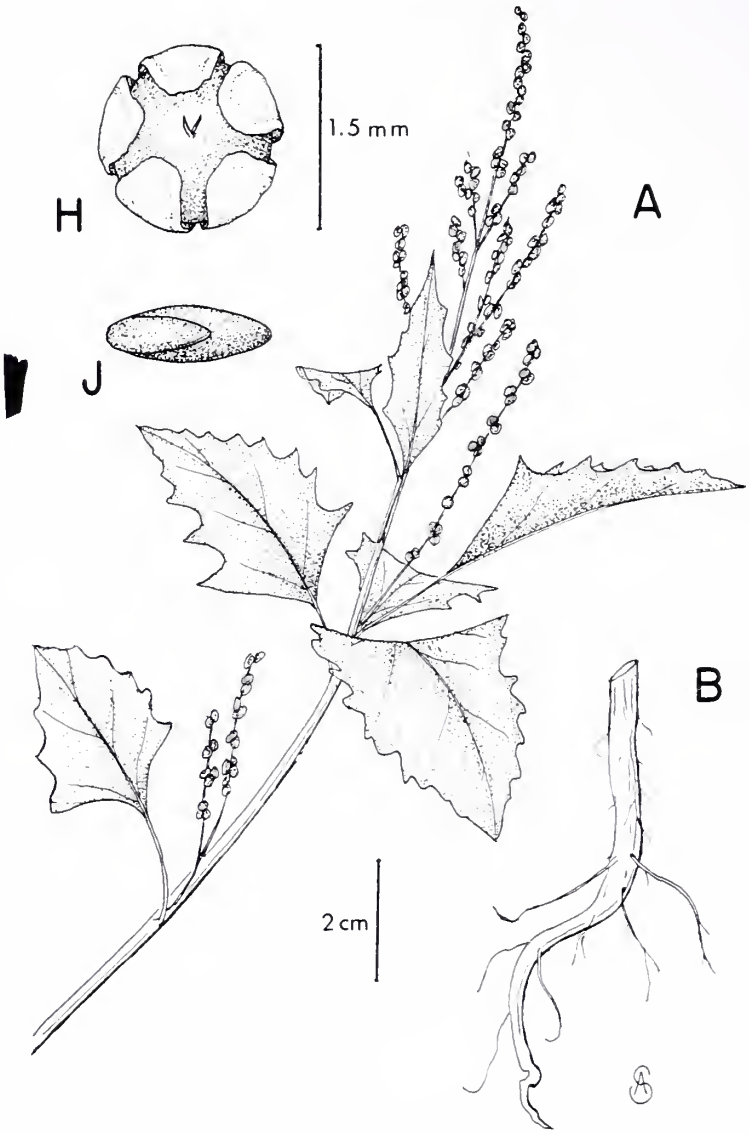
Fruiting: July-October

General Distribution: Quebec to the Northwest Territories, south to California, Texas and Virginia

Description: Plants with **bisexual** flowers; **stigmas** 2, erect or spreading, 0.1-0.2 mm long; **style** absent; **ovary** depressed-ovoid; **fruit** depressed-ovoid, the pericarp chartaceous, smooth, non-adherent; **seed** horizontal, black, lenticular, 0.9-1.0 mm high, 1.3-1.9 mm broad, testa smooth; **stamens** 5; **filaments** 0.3-0.5 mm long, membranaceous; **anthers** globose, yellow, 0.1-0.2 mm long; **perianth** 5-lobed; **lobes** fused at base, ovate to lanceolate, 0.7-1.0 mm long, 0.4-0.6 mm broad, slightly keeled abaxially, apex retuse, glabrous, margins meeting or separated by as much as their width, exposing more than half the seed at maturity; **bract** and **bracteoles** absent; **inflorescence** terminal and axillary, flexuous spikes and panicles, 6-15 cm long, the flowers in small widely spaced glomerules; **glomerules** irregularly globose, the flowers in different stages of development, 0.5-2.0 mm diameter; **leaves** ovate to triangular, 3.5-15.0 cm long, 2-9 cm broad, apex acute, base cordate to truncate, margins sinuate with 1-5 coarse acute teeth, upper leaves entire or with a few small teeth; **petioles** 1.5-4.5 mm long; **stems** erect, branched, 3-15 dm tall, grey, slightly mealy; **root system** annual with a taproot (2n = 36).

Note: This species has often been treated as part of *C. hybridum*, but typical *C. hybridum* is native to Europe and has more or less convex-lenticular, sometimes obliquely lenticular seeds with rounded margins and a foveolate-reticular surface. *Chenopodium simplex*, by contrast, has strongly convex-lenticular seeds with bluntly-keeled margins and smooth surfaces. *Chenopodium hybridum* has been reported from New York but I have seen no specimens.





12. *Chenopodium urbicum* L.

Common Name: City Goosefoot

Type Description: Linnaeus, Species Pl. I, p. 218, 1753

Origin: A native of Europe

Habitats: Waste places, especially about cities and towns, and along railroad tracks

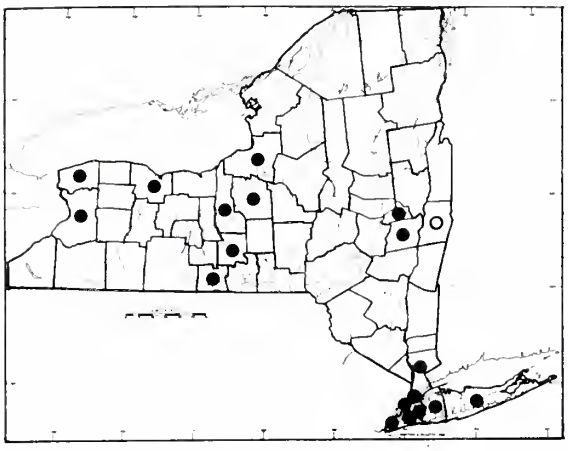
Habit: Erect, annual herbs

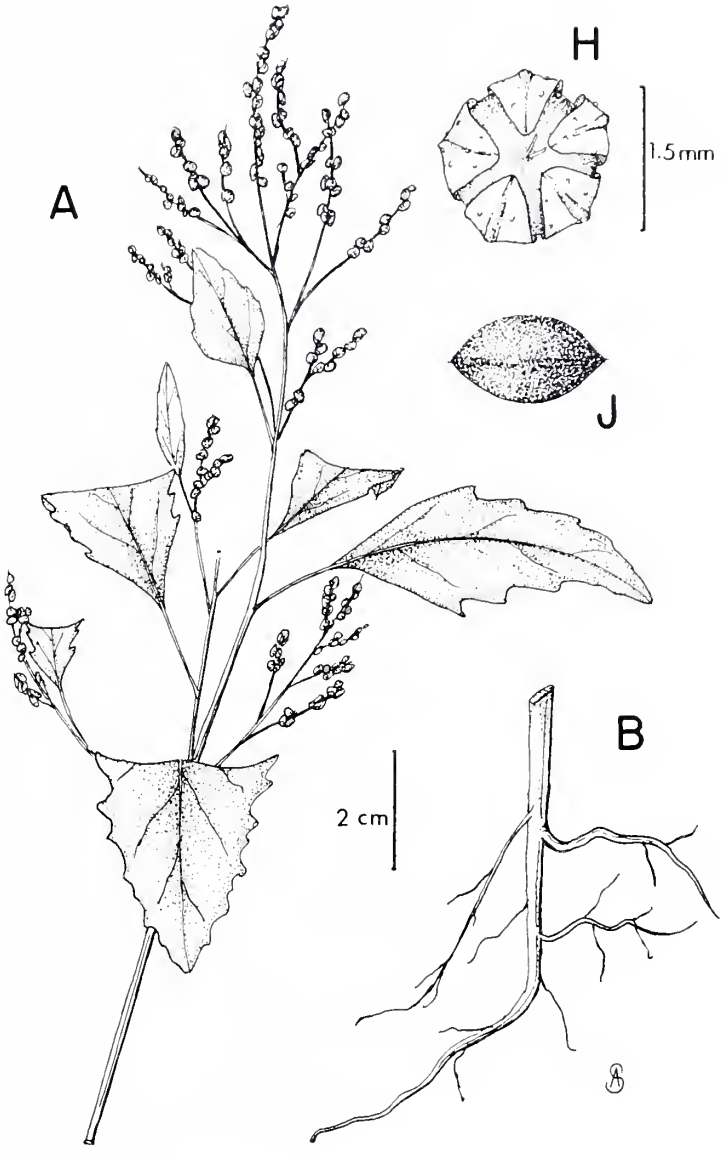
Flowering: August-September

Fruiting: August-September

General Distribution: Europe, Asia; in North America from Nova Scotia to Ontario and Wisconsin south to Missouri and Maryland

Description: Plants with **bisexual** flowers: **stigmas** 2, erect or spreading, 0.1-0.2 mm long; **style** absent; **ovary** depressed-ovoid; **fruit** depressed-ovoid, the pericarp membranaceous, papillose to smooth, non-adherent; **seed** horizontal (rarely, a few oriented vertically), black or reddish-brown, ovoid, lenticular, 0.8-1.2 mm broad, 0.5-0.6 mm thick, margin is rounded, testa rugose; **stamens** 5; **filaments** membranaceous, 0.3-0.5 mm long; **anthers** globose, yellow, 0.2-0.3 mm long; **perianth** 5-lobed; **lobes** broadly ovate to elliptic, 0.6-0.8 mm long, 0.4-0.8 mm broad, rounded or with a slight broad abaxial keel, apex obtuse, glabrous, only slightly covering the seed at maturity; **bract** and **bracteoles** absent; **inflorescences** erect, terminal panicles, and usually axillary, simple or compound spikes, 3.0-4.5 cm long, with glomerules at the nodes; **glomerules** subglobose, 2.0-3.5 mm in diameter; lower **leaves** mostly triangular, the upper triangular to lanceolate, 3-11 cm long, 3-10 cm broad, apex obtuse to acute, base truncate to cuneate, margins sinuate to dentate, often with obtuse to acute outward-pointing lobes at base; **petioles** 15-35 mm long; **stems** erect, simple or rarely branched, 3-10 dm tall, glabrous, stems angular, striated; **root system** annual with a taproot (2n = 36).





13. *Chenopodium murale* L.

Common Names: Sowbane, Nettle-leaf Goosefoot

Type Description: Linnaeus, Species Pl. I, p. 219, 1753

Origin: A native of Europe

Habitats: Waste places and along railroad tracks

Habit: Erect, annual herbs

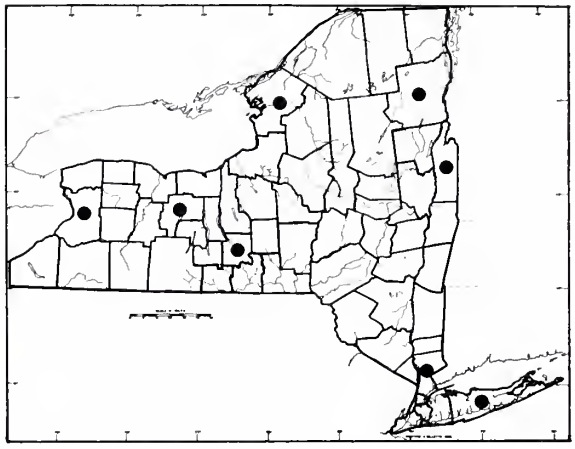
Flowering: August

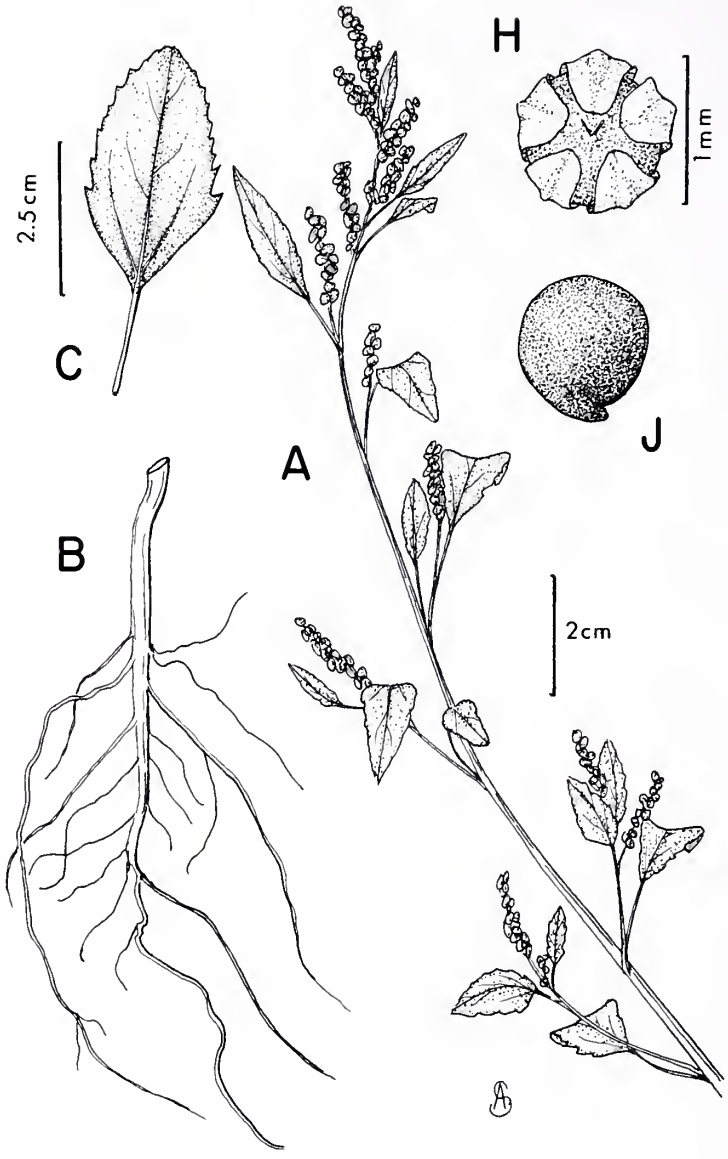
Fruiting: September-October

General Distribution: Quebec to British Columbia south to Mexico and Florida

Description: Plants with **bisexual** flowers; **stigmas** 2, erect or spreading, 0.1-0.4 mm long; **style** absent; **ovary** depressed-ovoid; **fruit** depressed-ovoid, pericarp membranaceous, pustulate, becoming smooth at maturity, adherent; **seed** horizontal, black, ovoid, lenticular, 1.1-1.5 mm in diameter, 0.6-0.8 mm thick, the margin acute, testa minutely rugose; **stamens** 5; **filaments** membranaceous, 0.5-0.7 mm long; **anthers** globose, yellow, 0.4-0.5 mm long; **perianth** 5-lobed; **lobes** ovate, 0.5-0.8 mm long, 0.6-0.7 mm broad, keeled abaxially, apex acute to obtuse, farinose, lobes covering the seed at maturity; **bract** and **bracteoles** absent; **inflorescences** terminal and axillary panicles, 6-7 cm tall, 4-5 cm broad, the flowers at each node in glomerules; **glomerules** subglobose, 2-4 mm in diameter, or the flowers not in glomerules; **leaves** rhombic-ovate, 2-4 (-8) cm long, 1-3 cm broad, apex acute to obtuse, base cuneate to subcordate, margins irregularly dentate; **petioles** 10-25 mm long; **stems** ill-scented, erect, branched, lower branches decumbent, 1-6 (-10) dm tall, glabrous to sparsely mealy; **root system** annual with a taproot ($2n = 18$).

Importance: The leaves and young stems are used as a salad herb.





14. *Chenopodium strictum* Roth var. *glaucophyllum* (Aellen) Wahl

Common Name: Goosefoot

Type Description: Roth, Nov. Pl. Spec., p. 180, 1821

Origin: A native of northeastern North America

Habitats: Sunny habitats, natural clearings and disturbed ground in weedy areas

Habit: Erect, annual herbs

Flowering: August-September

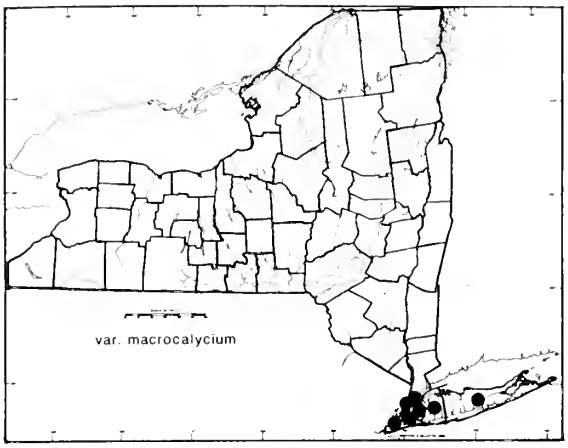
Fruiting: September-October

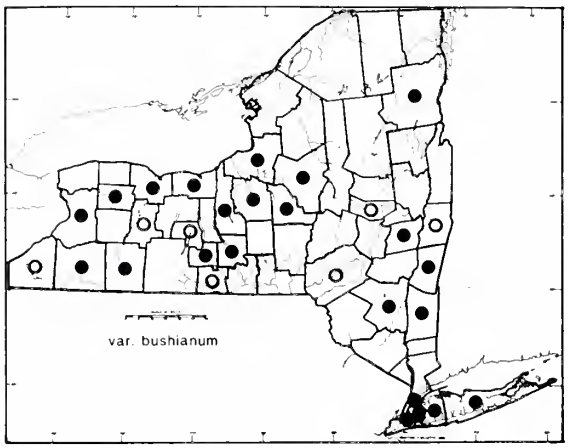
General Distribution: Prince Edward Island to British Columbia south to California, Arkansas and New York

Rarity Status: This taxon is ranked G5T? S1 by the New York Natural Heritage Program.

Description: Plants with **bisexual** flowers; **stigmas** 2, erect or spreading, 0.3-0.4 mm long; **style** absent; **ovary** depressed-ovoid; **fruit** depressed-ovoid, the pericarp membranaceous, smooth, adherent; **seed** horizontal, black, oval, lenticular, 0.9-1.5 mm in diameter, 0.4-0.5 mm thick, testa smooth; **stamens** 5; **filaments** membranaceous, 0.4-0.6 mm long; **anthers** oblong, yellow, 0.2-0.3 mm long; **perianth** 5-lobed; **lobes** ovate, 0.5-0.7 mm long, 0.6-0.7 mm broad, slightly keeled on back midrib, reflexed and exposing the fruit at maturity, farinose; **bract** and **bracteoles** absent; **inflorescence** terminal spikes, 1-3 cm long, the flowers at each node in glomerules; **glomerules** globose, 1.8-2.0 mm in diameter; basal **leaves** oblong-ovate to ovate-lanceolate, 1.7-3.6 cm long, 1.0-2.8 cm broad, apex obtuse, base cuneate, margins finely serrate, upper leaves tending toward lanceolate and entire; **petiole** absent, the blades sessile; **stems** erect, branched, up to 10 dm tall, glabrous to sparsely farinose, angular, green to red striped; **root system** annual with a taproot (2n = 36).

Note: This species has often been cited under the name *C. striatum* Krašan [*C. album* ssp. *striatum* (Krašan) Murr]. That name is a synonym of *Chenopodium strictum* var. *strictum* which is native to Asia and can be recognized by the prominently serrate, oblong-ovate lower leaves which are 3 or more times longer than wide.





15. *Chenopodium berlandieri* Moq.

Common Name: Pigweed

Type Description: Moquin-Tandon, Chenop. Monogr. Enum., p. 23, 1840

Origin: A native of North America

Synonym: *Chenopodium paganum* of American Authors, not Reichenb.

Habitats: Disturbed, moist areas such as roadside ditches

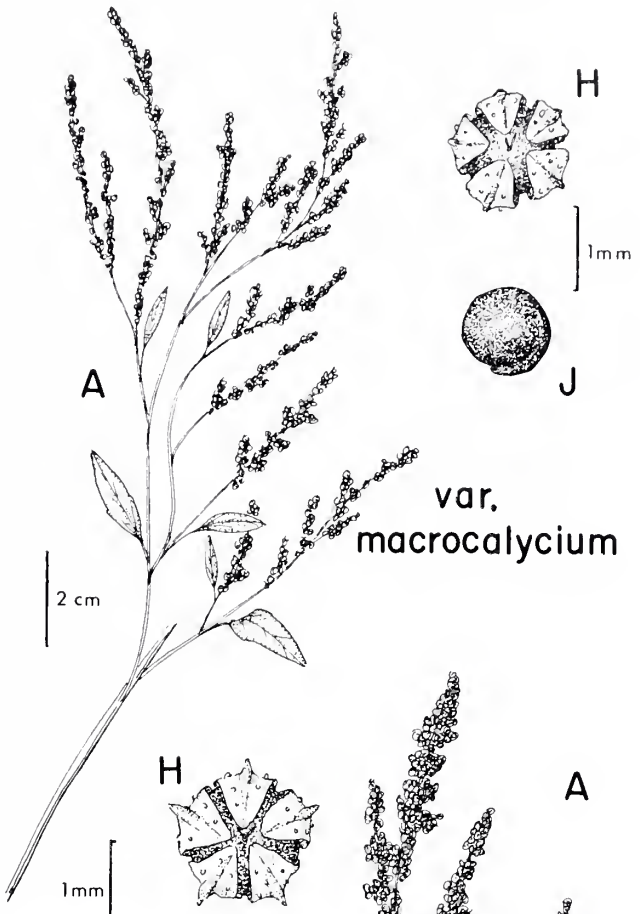
Habit: Erect, annual herbs

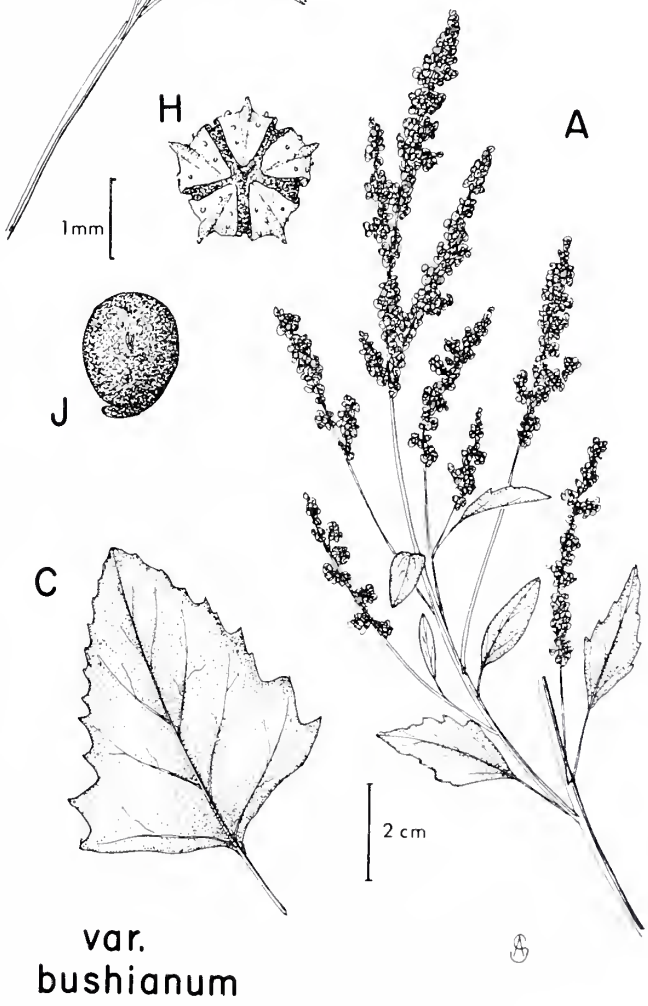
Flowering: August-October

Fruiting: September-October

General Distribution: Throughout most of North America; introduced and naturalizing in Europe

Description: Plants with **bisexual** flowers; **stigmas** 2, erect or spreading, 0.1-0.5 mm long; **style** 0.1-0.2; **ovary** depressed-ovoid; **fruit** depressed-ovoid, pericarp membranaceous, alveolate-rugose, adherent;





seed horizontal, brown to black, ovoid, lenticular, (1.3-) 1.5-2.0 mm broad, 0.7-0.9 mm thick, testa rugose; **stamens** 5; **filaments** membranaceous, 1.0-1.2 mm long; **anthers** globose, yellow, 0.2-0.3 mm long; **perianth** 5-lobed, 2.1-2.5 mm in diameter; **lobes** ovate to deltate, 1.0-1.5 mm long, 0.9-1.3 mm broad, apex obtuse, farinose, the adaxial keel often prominent, calyx lobes enlarged, obscuring the fruit in maturity; **bract** and **bracteoles** absent; **inflorescences** erect to drooping, terminal compound spikes, 5-15 cm long; **glomerules** at the nodes, irregularly rounded, 4-7 mm in diameter; **leaves** narrowly to broadly rhombic or ovate, 1.5-8.0 (-15) cm long, 0.7-5.0 cm broad, apex acute, base cuneate to truncate, margins serrate or irregularly dentate (to entire in shade forms); **petioles** 7-70 mm long; **stems** erect to semi-erect, much-branched to simple, 2-10 dm tall, ribbed, farinose; **root system** annual with a taproot (2n = 36).

KEY TO VARIETIES

1. Style base (stylopodium) often prominent, with a small yellow area of separable pericarp; perianth lobes prominently keeled .....[*C. berlandieri var. zschackei*, a waif]
1. Style base less prominent or lacking; perianth parts usually not prominently keeled .....(2)
   2. Inflorescence large and drooping; seeds 1.5-2 mm in diameter .....15a. *C. berlandieri var. bushianum*
   2. Inflorescence small and erect; seeds 1.4-1.7 mm in diameter .....15b. *C. berlandieri var. macrocalycium*

15a. *Chenopodium berlandieri* var. *macrocalycium* (Aellen) Cronq.

Type Description: Aellen, Feddes Repert. Spec. Nov. Regni Veg. vol. 26, p. 119, 1929

Synonym: *Chenopodium macrocalycium* Aellen

Origin: Native to the Mid-Atlantic Coast of North America

Habitats: Coastal sands, beaches

Habit: Erect, annual herbs

General Distribution: Along the Atlantic coast, from Nova Scotia to North Carolina

Rarity Status: This variety is ranked G4T4 S3? by the New York Natural Heritage Program and has been placed on their watch-list

15b. *Chenopodium berlandieri* var. *bushianum* (Aellen) Cronq.

Type Description: Aellen, Feddes Repert. Spec. Nov. Regni Veg. vol. 26, p. 63, 1929

Synonyms: *Chenopodium bushianaum* Aellen, *C. paganum* Reichenb. in part.

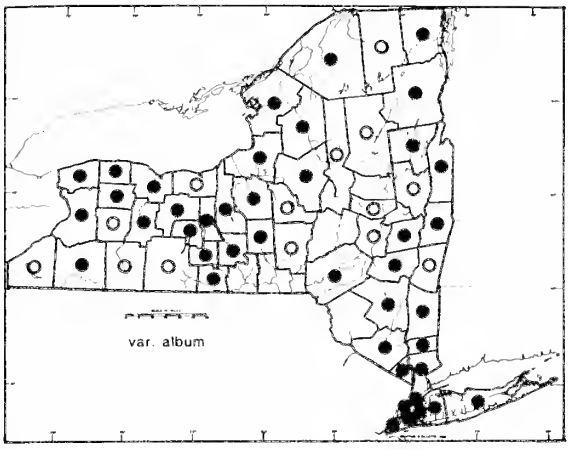
Origin: Native to northeastern North America

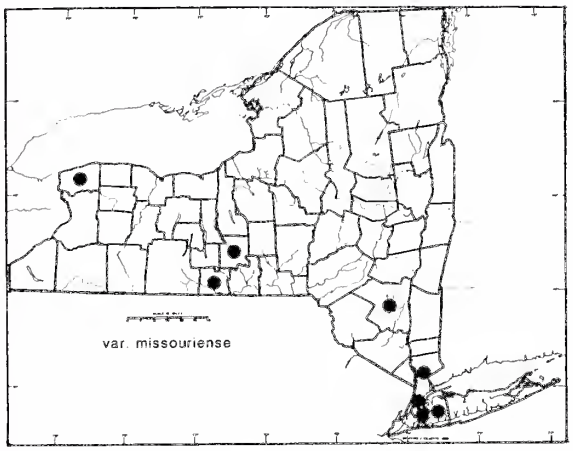
Habitats: Disturbed areas, mostly as a weed in cultivated ground

General Distribution: Quebec to Ontario south to Missouri and Virginia

Note: The related species, *Chenopodium quinoa*, Willd. may have been collected in New York City. The specimen was too young for positive identification. Quinoa is an important grain crop in the Andean Highlands of South America.

Chenopodium berlandierii var. *boscianum* (Moq.) Wahl has been reported from New York, but, true *C. berlandierii* var. *boscianum* is found only along the Gulf coast. These reports probably refer to *Chenopodium standleyanum*.





16. *Chenopodium album* L.

Common Names: Lamb's-quarters, Goosefoot, Pigweed

Type Description: Linnaeus, Species Pl. I, p. 219, 1753

Origin: A native of Eurasia that has followed man around the world

Habitats: Disturbed soils in open habitats such as roadsides, foot paths, pavement cracks, shores, gardens, meadows and lawns

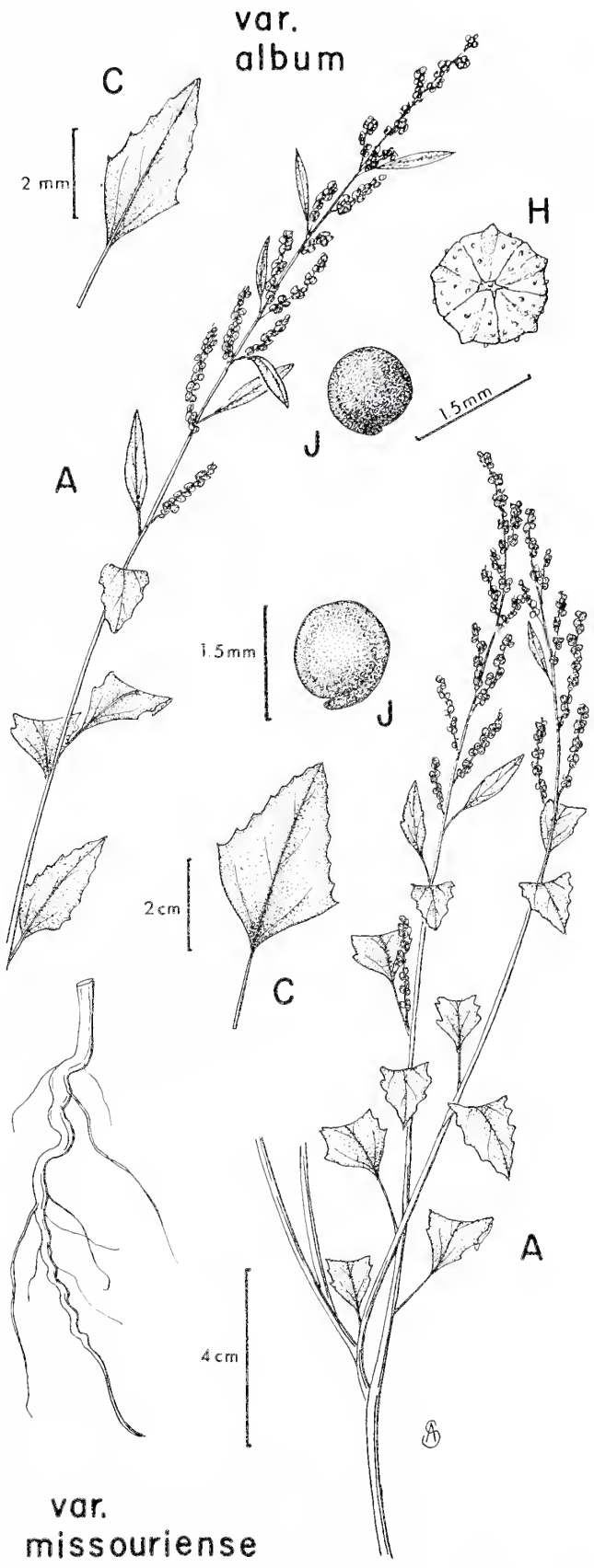
Habit: Erect, annual herbs

Flowering: July-September

Fruiting: August-November

General Distribution: Cosmopolitan and ubiquitous, scattered throughout North America, except in areas of extreme desert conditions, from Newfoundland to Alaska south to Mexico

Description: Plants with **bisexual** flowers; **stigmas** 2, erect or spreading, 0.1-0.2 mm long; **style** absent;



ovary depressed-ovoid; **fruit** depressed-ovoid, the pericarp membranaceous, smooth to papillate, adherent or usually non-adherent; **seed** horizontal, black, lenticular, round in outline, 0.9-1.6 mm broad, 0.5-0.7 mm thick, testa smooth, papillose or with faint reticulate-rugose ridges; **stamens** 5; **filaments** membranaceous, 0.6-0.7 mm long; **anthers** globose, yellow, 0.3-0.4 mm long; **perianth** 5-lobed; **lobes** ovate, 0.7-1 mm long, 0.7-1.1 mm broad, the midrib keeled on back, apex obtuse, farinose, largely covering the upper half of the seed at maturity; **bract** and **bracteoles** absent; **inflorescences** terminal and axillary, compound spikes 2-19 cm long, flowers usually in glomerules at the nodes, with occasional single-flowered peduncles present; **glomerules** subglobose, 3-4 mm in diameter; **leaves** ovate-lanceolate or rhombic-lanceolate, to broadly oblong, 1.0-5.5 (-12) cm long, 0.5-3.8 (-8) cm broad, apex acute, base cuneate, margins sinuous-dentate to shallowly serrate or entire; **petioles** 1.0-2.5 cm long; **stems** erect to sprawling, simple to much-branched, 1-25 dm tall, branch tips pinkish and farinose with crowded leaf bases, the stems angular, greenish or sparsely farinose, sometimes tinged with red at maturity; **root system** annual with a taproot (2n = 36, 54).

KEY TO VARIETIES

1. Fruits 1.1-1.5 mm in diameter; flowering from mid-July onward; lower leaves more than 1.5 times longer than wide ....16a. *C. album var. album*
1. Fruits 0.9-1.2 mm in diameter; flowering from mid-September onward; lower leaves less than 1.5 times longer than wide ....16b. *C. album var. missouriense*

16a. *Chenopodium album* var. *album*

Synonyms: *Chenopodium album* var. *lanceolatum* (Muhl.) Coss. & Germ., *C. lanceolatum* Muhl.

Origin: A native of Eurasia

Habitats: Disturbed areas from cultivated fields to vacant lots and pavement cracks

General Distribution: Cosmopolitan; in North America from Newfoundland to Alaska south to Mexico

Variation: Whereas Bassett and Crompton (1982) considered *C. lanceolatum* to be a form of *C. album*, the two are here considered to be minor variants of the same taxon. Apparently, the differences between these two taxa are phenotypic responses to habitat, in that *C. album* grows on cultivated ground and has an erect growth habit, while *C. lanceolatum* grows in vacant lots, roadsides, etc., and has a more sprawling habit.

16b. *Chenopodium album* var. *missouriense* (Aellen) Bassett & Crompton

Type Description: Aellen, Bot. Not., p. 206, 1928

Synonyms: *Chenopodium missouriense* Aellen, *C. paganum* Reichenb. in part

Origin: Eastern-central North America

Habitats: Disturbed areas

General Distribution: New York to Ontario south to Missouri and Tennessee

Rarity Status: This taxon has been ranked G5T5 S3? by the New York Natural Heritage Program and placed on their watchlist.

Note: *Chenopodium album* is one of the more widespread and common angiosperms on earth. Several other species have often been recognized as infraspecific taxa under *C. album*, including *C. berlandieri*, *C. strictum* and their varieties. This treatment follows Bassett and Crompton (1982) in only including *C. missouriense* and *C. lanceolatum* in the complex.

Waifs: *Chenopodium aristatum* L., collected at a cotton mill, Yonkers, Westchester Co.; *Chenopodium berlandieri* var. *zschackei* (Murr) Murr; *Chenopodium fremontii* has been reported from Tompkins County; *Chenopodium foliosum* (Moench) Aschers., wool mills, Yonkers, Westchester Co. and reported from Troy (Rensselaer Co.); *Chenopodium graveolens* was reported from Onondaga Co. but no specimens have been seen; *Chenopodium opulifoilum* Schrad., probably occurred as a waif; the specimens were collected when immature; *Chenopodium polyspermum* L., Genesee, Oneida, Rensselaer Counties. and reported from Onondaga Co., not seen in over 50 years; *Chenopodium vulvaria* L., Monroe County and reported from Queens and Richmond counties, not seen in over 50 years.

Amaranthaceae (Amaranth Family)

The Amaranthaceae: a family of about 65 genera and 900 species, of nearly cosmopolitan distribution. Amaranths are particularly widespread in tropical and subtropical regions, with relatively few species in cooler climates. Amaranth/chenopod type pollen has been found as early in the fossil record as the Maestrichian Period. Several species (notably *Celosia*, *Amaranthus* and *Gomphrena*) are familiar garden ornamentals. Species of *Amaranthus* are of considerable importance as foods (pseudo-grains and pot herbs) in many parts of the world, and certain so-called "grain-amaranths" are being studied as potential crops to be grown in the United States and elsewhere for sale on the world market. *Amaranthus* species have also been extracted for dyes.

FAMILY DESCRIPTION

A family of annual or perennial herbs, often woody at the base (suffrutescent), seldom climbers, sub-shrubs, shrubs or, rarely,, small trees. The stems are erect to decumbent, trailing, or climbing, usually from a taproot. Leaves are alternate or opposite, simple and usually entire; sometimes the margin is undulate, infrequently serrulate, dentate or shallowly lobed. Petioles are long to absent, the leaf blades then sessile. Stipules are absent. The inflorescences are compact cymes or clusters arranged in axillary or terminal, simple or compound spikes, panicles, heads or rarely racemes (or flowers may be solitary). Each flower is subtended by 1 bract and usually 2 bracteoles. Bracts and bracteoles are usually scarious, often spinose, the bract being persistent, while the bracteoles either fall with the fruit or not. The flowers are small, generally regular in symmetry, bisexual or less often unisexual, sometimes aborted. Sepals are usually 4 or 5, seldom 1-3 or absent; they are free or connate, equal to subequal, imbricate, often dry and scarious or chartaceous. Stamens are as many as the sepals and opposite them, seldom fewer, their filaments distinct or, more often, connate at their bases into a tube; a nectary ring is often present within the tube base, and the tube is often toothed or lobed (with "pseudostaminodia"), alternate with the anthers. Anthers tetrasporangiate and dithecal, or, less often, bisporangiate and unithecal. The ovary is superior, 1-locular with 2-3 (-4) carpels. The style is terminal, usually solitary. Stigmas may be entire and capitate, 2-3 lobed, with segments capitate to subulate and erect or divergent, persistent. Ovules are solitary, and basal (rarely apical and pendulous), or, in a few genera, there are several ovules on a basal or short, free central placenta. The ovules are campylotropous or amphitropous, bitegmic and crassinucellar. The fruit is a dry, 1-several seeded, indehiscent, circumscissile, or irregularly dehiscent utricle or pyxis (rarely a berry or drupe). Seeds are small, mostly lenticular, subglobose to subreniform, brown to black, erect or inverted, sometimes enclosed by a small to large, bivalved aril, its testa usually shining-crustaceous. The embryo is peripheral, annular, and surrounding abundant, starchy, hard or granular perisperm. The radicle is either basal or superior. The true endosperm is nearly or quite absent. The 2 cotyledons are incumbent.

KEY TO GENERA[1]

1. Leaves alternate; flowers unisexual, the plants monoecious or dioecious ..... 1. *Amaranthus*
1. Leaves opposite; flowers bisexual ..... (2)
   2. Sepals connate, with long, dense hairs on the outside; inflorescences of interrupted, compound spikes, not immediately subtended by leaves; perianth tube bearing a lateral crest or spines in fruit ..... 2. *Froelichia*
   2. Sepals free, glabrous; inflorescences terminal heads, or short, axillary spikes; perianth tube without lateral spines ..... (3)
3. Inflorescences immediately subtended by one or more leaves . ..... 3. *Gomphrena*
3. Inflorescences not subtended by leaves ..... 4. *Alternanthera*

1. AMARANTHUS

Common Name: Amaranth

Authority: Linnaeus, Species pl. I, p. 989, 1753

A genus of about 90 species, now distributed nearly world-wide but best developed in the New World. Amaranths have long been used for a variety of purposes. Three species are important grain crops in the neotropics. The seeds are high in proteins, particularly those high in lysine. Seeds of the "pseudocereals" have been found in several archaeological sites in the New World and in

[1] *Celosia argentea* L., cocks-comb, is a showy garden plant, commonly cultivated in New York State, that may occasionally escape, but no specimens or records of this have been seen. Members of this genus have several seeds per ovary and alternate leaves.

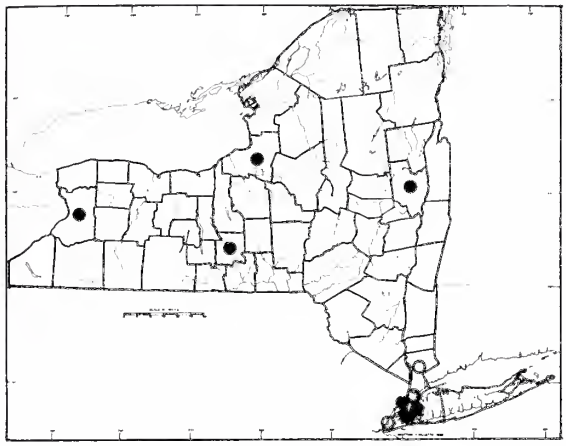
Europe, and they may have been among the earliest plants domesticated by man. Many species are also used as pot herbs and vegetables. A few species with highly-pigmented foliage and flowers are used as ornamentals and dye plants. Several amaranths are noxious weeds, and a few species are known to concentrate nitrates and become poisonous to livestock.

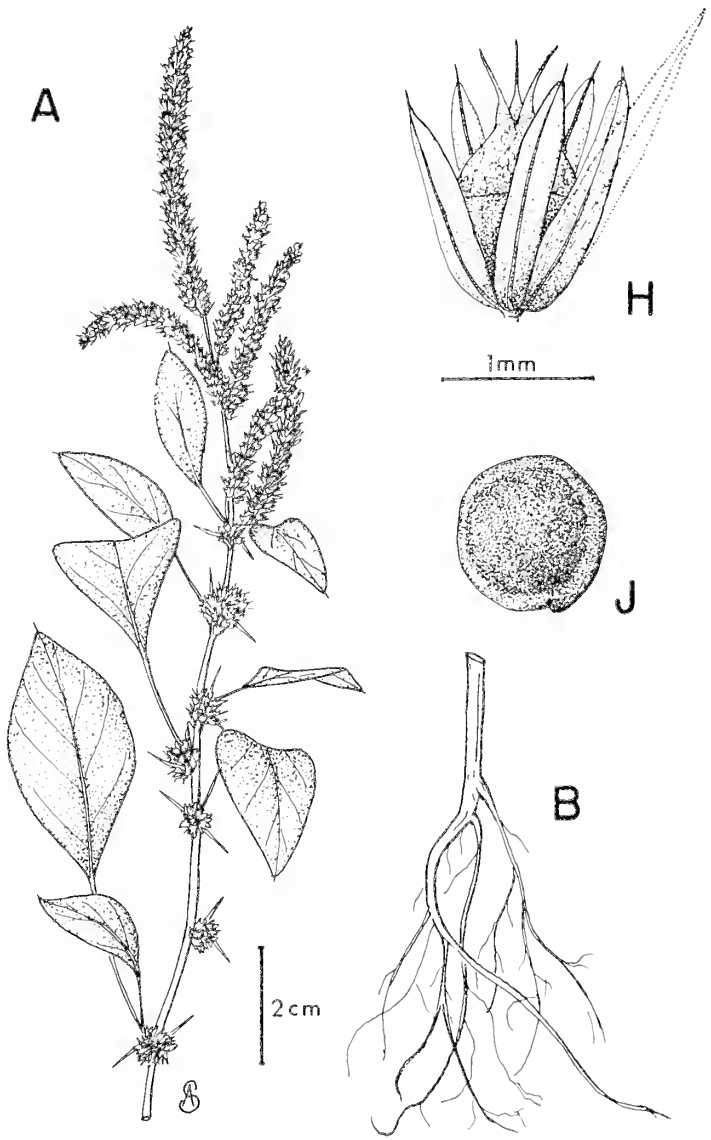
Description: Plants with **unisexual** flowers, either **monoecious** or **dioecious**; **stigmas** 2-4, subulate, papillose, sometimes interpreted as style branches; **style** 1 or absent; **ovary** 1, ovoid, absent in staminate flowers, unilocular; **ovule** 1, basally attached, erect, the micropyle inferior, funiculus short; **fruit** a circumscissile, irregularly-dehiscent, or indehiscent utricle, pericarp membranaceous; **seed** 1, vertical, lenticular to subglobose; **embryo** coiled in a ring around the perisperm; **perisperm** mealy; **radicle** basal; **stamens** 3-5, hypogynous, absent in female flowers; **filaments** free to the base, linear, opposite sepals; **anthers** bisporangiate, dorsifixed, introrse; **perianth** of 3-5 sepals, absent or rudimentary in carpellate flowers; **sepals** distinct, membranaceous, subequal or the outer exceeding the inner, glabrous, the midrib faint to broad, usually excurrent and often spinose; **peduncles** usually very short, the glomerules subsessile; **bracts** lanceolate; **bracteoles** 2; **inflorescences** terminal and axillary spikes or compound spikes, or the flowers in axillary glomerules; **glomerules** unisexual or bisexual, when bisexual the first (terminal) flower is male and succeeding flowers are female; **leaves** simple, alternate, entire or undulate, rhombic, lanceolate, ovate, oblanceolate, obovate, or rarely spatulate and emarginate, sometimes somewhat fleshy, green to reddish or yellowish, the midrib often excurrent and sometimes spinose; **petioles** usually elongate; **stipules** absent but spines sometimes replacing them at leaf bases; **stems** herbaceous to suffrutescent, erect, ascending, or infrequently decumbent, simple or much-branched from the base, sometimes striate or fleshy, green to reddish or whitish, borne on a stout, annual **taproot** or rarely a perennial **rootstalk**.

KEY TO SPECIES

1. Plants with spines at leaf bases; terminal spikes with male flowers at apex and female flowers at base ..... 1. *A. spinosus*
1. Plants without spines at leaf bases; terminal spikes (if present) either all one sex or with scattered male and female flowers ... . (2)
   2. Plants dioecious; inflorescences terminal only; perianth of female flowers usually with 0-2 sepals ..... (3)
   2. Plants monoecious; inflorescences terminal or axillary; perianth of female flowers with 3-5 sepals ..... (10)
3. Plant pistillate ..... (4)
3. Plant staminate ..... (7)
   4. Fruit indehiscent; sepals lacking or sporadically present and rudimentary, less than 1 mm long, without visible midveins (5)
   4. Fruit circumscissile; sepals regularly present, at least 1 mm long, with distinct midveins ..... (6)
5. Seeds 1.9-3.0 mm long; utricle 2.2-3.5 (-4) mm long; leaf-blades usually narrowly lanceolate to linear ..... 2. *A. cannabinus*
5. Seeds 0.8-1.2 mm long; utricle 1.0-2.3 mm long; leaf-blades usually broadly lanceolate ..... 3. *A. tuberculatus*
   6. Sepals 1-2 (-3), lanceolate to linear ..... 4. *A. rudis*
   6. Sepals 5, the inner ones spatulate ..... [*A. palmeri*, a waif]
7. Outer sepals (of male flowers) without heavy midveins, not appreciably longer than the inner sepals; bracts mostly with slender midribs, 0.6-1.5 mm long ..... (8)
7. Outer sepals with heavy midveins, often longer than the inner ones; bracts with heavy midribs, 1-4 mm long ..... (9)
   8. Bract 0.6-1.3 mm long, the midrib scarcely excurrent ..... 2. *A. cannabinus*
   8. Bract 1.0-1.5 mm long, the midrib conspicuously excurrent ..... 3. *A. tuberculatus*
9. Bract 1.0-1.5 mm long, shorter than outer sepals . . .. 4. *A. rudis*
9. Bract about (2.5-) 3-4 mm long, equalling or longer than the outer sepals ..... [*A. palmeri*, a waif]
   10. Inflorescence composed of axillary glomerules only ..... (11)
   10. Inflorescence with long, terminal panicle, occasionally with axillary glomerules ..... (14)
11. Bracteoles twice as long as the female perianth; sepals of female flowers 3 ..... 5. *A. albus*
11. Bracteoles shorter than, or equal to, the female perianth; sepals of female flowers 4-5 ..... (12)
   12. Fruits circumscissile, smooth; leaves neither crisped nor fleshy ..... 6. *A. blitoides*
   12. Fruits indehiscent, rugose; leaves conspicuously crisped or fleshy ..... (13)
13. Leaves rhomboid to obovoid, crisped, not fleshy; fruits 1.5- 2.0 mm long ..... 7. *A. crispus*
13. Leaves obovoid to suborbicular, fleshy, not crisped; fruits 2.5-4.0 mm long ..... 8. *A. pumilus*
   14. Fruits indehiscent; sepals of female flowers 3 ..... (15)
   14. Fruits circumscissile; sepals of female flowers 3-5 ..... (17)
15. Leaves emarginate or subtruncate; fruits smooth ..... 9. *A. blitum*
15. Leaves acute; fruits smooth or muricate ..... (16)
   16. Fruits muricate, shorter than to about equaling the perianth ..... [*A. viridis*, a waif]
   16. Fruits smooth or slightly wrinkled, ca. twice as long as the perianth ..... [*A. deflexus*, a waif]

17. Bracts longer than the fruit; seeds dark brown to black, common weeds .....(18)
17. Bracts shorter than the utricle; seeds usually pale ivory to reddish brown; rare escapes from cultivation .....(20)
18. Sepals all retuse or obtuse; inflorescence branches short and thick, often spreading .....10. *A. retroflexus*
18. Sepals (at least the outer ones) acute to acuminate; inflorescence branches long or slender or both, often ascending ...(19)
19. Bract about 5 mm long, with a very heavy midrib; stigmas thick at base; sepals and stamens 3-5 .....11. *A. powellii*
19. Bract 3-4 mm long, with moderately heavy midrib; stigmas slender at base; sepals and stamens 5 .....12. *A. hybridus*
20. Inflorescence stiff; bract equalling stigmas, with a moderately heavy midrib; stigmas thick at base ...13. *A. hypochondriacus*
20. Inflorescence lax; bract not equalling the stigmas or exceeding utricle, with slender midrib; stigmas slender at base ..(21)
21. Sepals straight, the inner one oblong, subacute; stigmas erect .....14. *A. cruentus*
21. Sepals recurved, the inner ones spatulate, obtuse or emarginate; stigmas spreading .....15. *A. caudatus*





1. *Amaranthus spinosus* L.

Common Names: Spiny Amaranth, Thorny Amaranth

Type Description: Linnaeus, Species Pl. II, p. 991, 1753

Origin: Native to tropical America

Habitats: Waste areas, dumping grounds, ballast heaps

Habit: Erect, annual herbs

Flowering: July-August

Fruiting: August-September

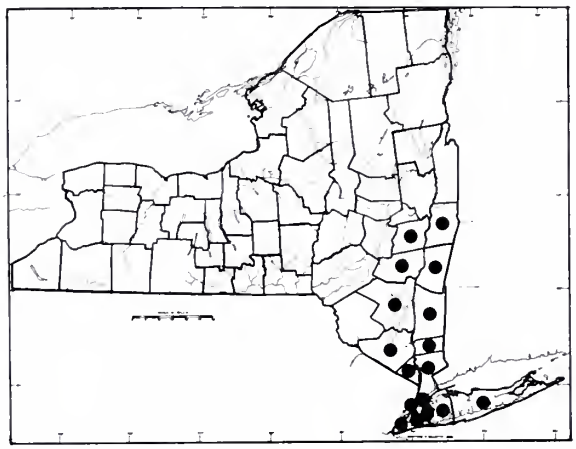
General Distribution: Widespread in the tropics, and introduced in temperate areas; in North America: southern Ontario to southern Manitoba south to Florida and Mexico

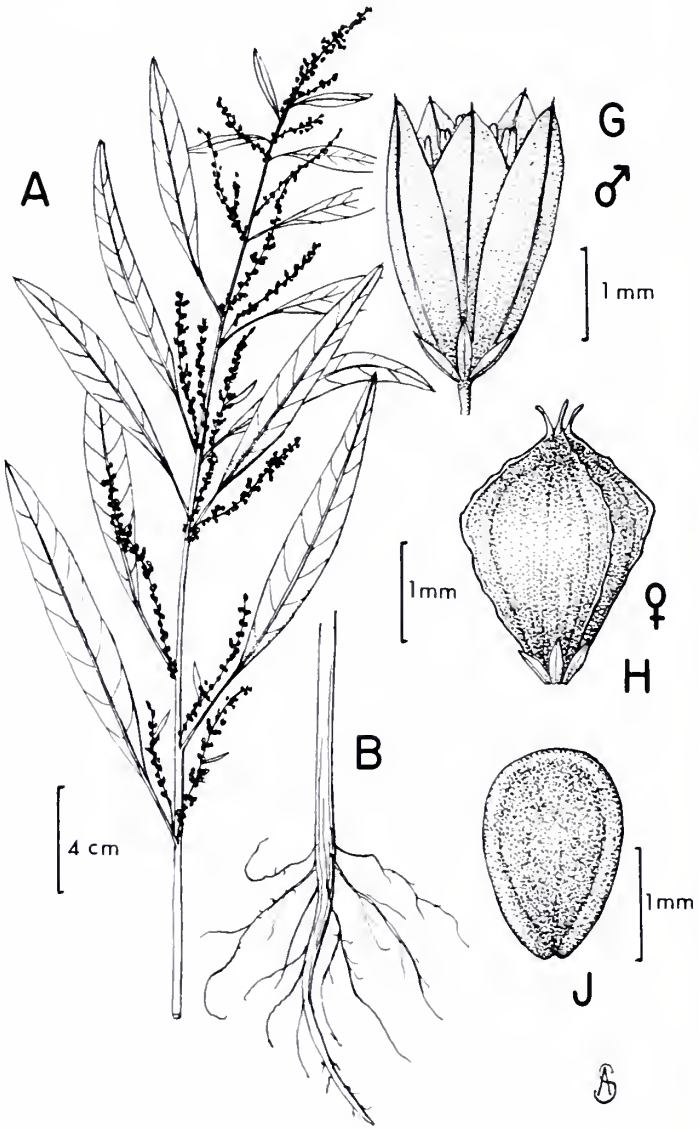
Description: Plants **monoecious**; **female flowers: stigmas** 3, erect, 0.4-1.3 mm long; **style** absent; **fruit** dry, circumscissile (rarely indehiscent or irregularly bursting), ovoid to ellipsoid, 1.5-2.0 mm long, 0.7-1.0 mm broad, smooth above, wrinkled below, stramineous; **seed** black to dark reddish-brown, lenticular, round in outline, 0.7-1.0 mm in diameter, 0.5-0.6 mm thick, testa smooth; **sepals** 5, oblong, obtuse to acute, 1-nerved, nerve excurrent, 1.0-1.7 mm long, 0.6-0.7 mm broad; **bracts** ovate to lanceolate or subulate, 0.5-3.0 mm long, 0.2-1.1 mm broad, tapering to a stout, subulate green tip; **male flowers: stamens** 5; **filaments** membranaceous, 1.5-2.1 mm long; **anthers** ellipsoid, light yellow to reddish, 0.6-1.3 mm long; **sepals** 5, lance-oblong, acute to acumi-

nate, the outer sepals subulate-tipped, 1.0-2.1 mm long, 0.6-0.7 mm broad; **bracts** ovate to lanceolate, 0.8-2.5 mm long, 0.5-0.8 mm broad, spinose-tipped; **bracteoles** ovate, 0.7-0.9 mm long, 0.4-0.5 mm wide; **inflorescences** terminal and axillary, erect or drooping, leafless spikes, 3-8 cm long, 5-7 mm broad; **glomerules** unisexual, sessile, the pistillate glomerules in leaf axil or at the proximal nodes of spikes, 0.7-1.0 mm in diameter, staminate glomerules at the distal nodes of the spikes, 0.7-1.1 cm in diameter; **leaves** ovate to ovate-lanceolate or rhombic-ovate, 1.5-5.5 (12) cm long, 0.5-3.2 cm broad, apex obtuse, broadly rounded or emarginate, spinose mucronate, base broadly cuneate, surfaces glabrous to sparingly pubescent; **petioles** slender, 0.5-5.0 (-9) cm long, often pubescent, bearing in the axil 2 rigid, sharp-pointed spines, 2-11 (-25) mm long; **stems** stout, succulent, erect or ascending, 2.5-6.5 (-12) dm tall, sulcate, often reddish, glabrous below, more or less pubescent above; **root system** annual, with a taproot that is sometimes branched (2n = 34).

Infraspecific Variation: Several minor variants have been named, based on presence of spines and color of the inflorescence. None of these occur in New York State.

Importance: Young, soft-spined plants are sometimes eaten as a pot herb. In Latin America a decoction of the plants is used as a remedy for rheumatism and bladder inflammations, taken as an emmenagogue, used for bathing to allay fever and applied to external inflammations. The crushed or lightly cooked leaves may serve as a poultice. A root decoction is also taken as a diuretic and for bladder distress.





2. *Amaranthus cannabinus* (L.) Sauer

Common Name: Salt-marsh Water-hemp

Type Description: Linnaeus, Species Pl. II, p. 1027, 1753

Synonyms: *Acnida cannabina* L., *A. cannabina* var. *lanceolata* Moq. in DC., *A. cannabina* var. *salicifolia* (Raf.) Moq. in DC., *A. elliotii* Raf., *A. obtusifolia* Raf., *A. rusocarpa* Michx., *A. rhyssocarpa* Spreng., *A. salicifolia* Raf., *Amaranthus macrocaulos* Poir.

Origin: A native of eastern North America

Habitats: Tidal mudflats, marshes, swamps and river banks, most common in sandy places from fresh to salt water shores

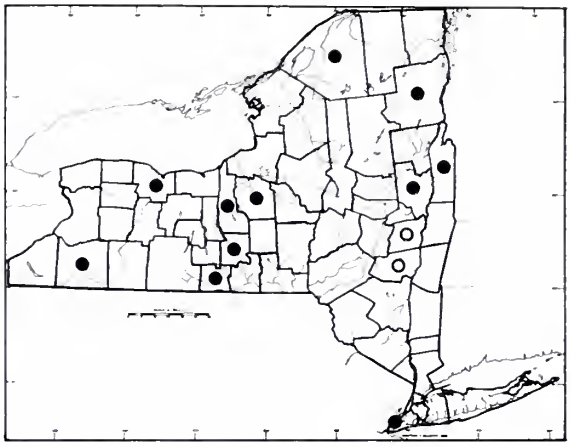
Habit: Erect, slightly succulent, annual herbs

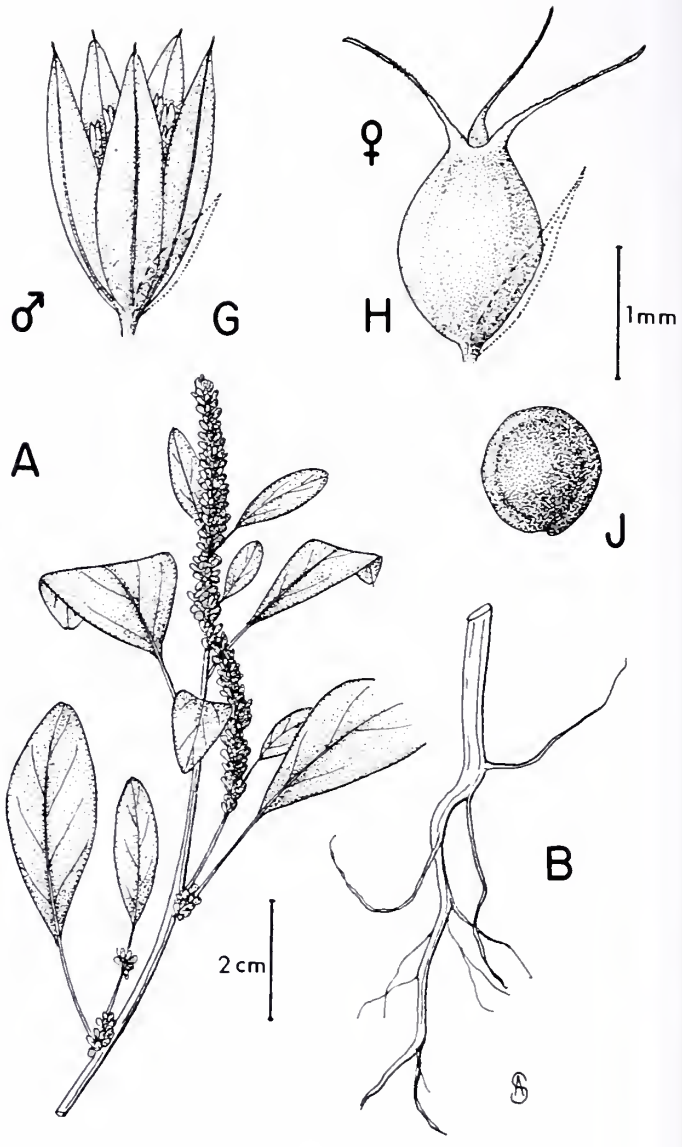
Flowering: July-September

Fruiting: July-late October

General Distribution: Atlantic Coast from Maine to northeastern Florida and inland along tidal waterways (Hudson River)

Description: Plants **dioecious**; **female flowers**: **stigmas** 3-5, erect to spreading, 0.7-1.2 mm long; **style** absent; **fruit** fleshy, indehiscent, ovoid to turbinate, 2.2-3.5 (-4) mm long, 2.4-3.5 mm broad, with 3-5 prominent, dentate or tuberculate, longitudinal ridges corresponding with the stigmas, green when young, often becoming rugose and black when mature; **seed** dark reddish-brown, obovoid to ellipsoid, flattened with a depressed endosperm, 1.9-3.0 mm in diameter, 0.9-1.1 mm thick, testa minutely granulate to nearly smooth; **sepals** usually absent, rarely 1-2, irregular, 0.6-1.0 mm long, 0.3-0.4 mm broad; **bracts** lanceolate to ovate or oblong, 1.2-1.6 (-2.2) mm long, 0.4-0.5 mm broad, acute, midrib moderately heavy, scarcely excurrent; **male flowers**: **stamens** 5; **filaments** membranaceous, 1.5-1.6 mm long; **anthers** ellipsoid, light yellow, 1.0-1.5 mm long; **sepals** 5, oblong, 1.9-3.0 mm long, 0.8-1.0 mm broad, the inner ones emarginate, the outer acute, membranaceous with a narrow, excurrent midvein; **bracts** lanceolate, 0.6-1.3 mm long, 0.4-0.8 mm broad, midrib very slender, scarcely excurrent; **female inflorescences** terminal and axillary, often flexuous, leafy or leafless spikes, 5-20 cm long, 5-10 mm broad (occasionally glomerules are found in leaf axils); **male inflorescences** terminal and axillary, leafless, spikes 4-15 cm long, 5-7 mm broad, glomerules occasionally clustered in leaf axils; **glomerules** unisexual, sessile, pistillate glomerules often spaced along the rachis, 0.6-1.0 cm in diameter, usually with reduced leaves subtending basal glomerules, staminate glomerules usually densely clustered on the rachis, 0.5-0.6 cm in diameter; **leaves** narrowly lanceolate to linear, 5-15 cm long, 1-2 (-3) cm wide, apex long-attenuate or acuminate, with a rounded or obtuse tip, acute to attenuate at the base, glabrous to minutely tomentose; **petioles** slender, 1.5-5.5 cm long, glabrous to minutely tomentose; **stems** stout, erect, 3-30 dm tall, often enlarged at the base, smooth or sulcate, green, with ascending branches; **root system** annual with a short, thick taproot and fibrous lateral rootlets.





3. *Amaranthus tuberculatus* (Moq. ex DC.) Sauer

Common Names: Rough-fruited Water-hemp, Tall Water-hemp

Type Description: DeCandolle, Prodr. 13(2): 277, 1849

Synonyms: *Acnida altissima* (Ridd.) Moq. ex Standl., *A. subnuda* (S. Wats.) Standley, *A. tamariscina* var. *prostrata* Uline & Bray, *A. tamariscina* var. *subnuda* Coult., *A. tuberculata* Moq. ex DC., *A. cannabina* L. var. *concatenata* Moq., *Amaranthus altissimus* Riddell, *Montelia tamariscina* (Nutt.) A. Gray

Origin: Native to central North America

Habitats: Exposed margins of rivers, creeks, lakes, ponds, marshes, and bogs or artificially disturbed areas, such as roadside ditches, fields and gardens

Habit: Prostrate to erect, succulent, annual herbs

Flowering: July-August

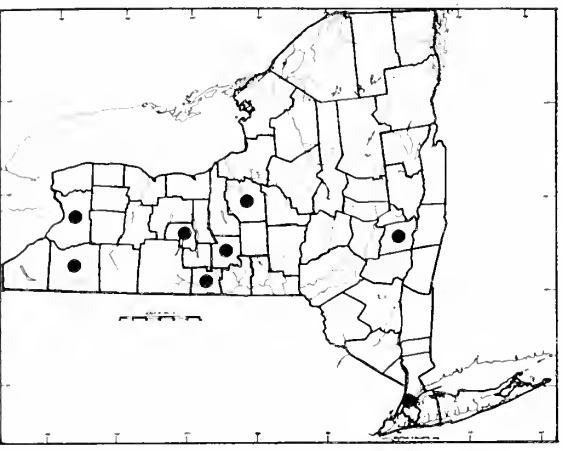
Fruiting: August-September

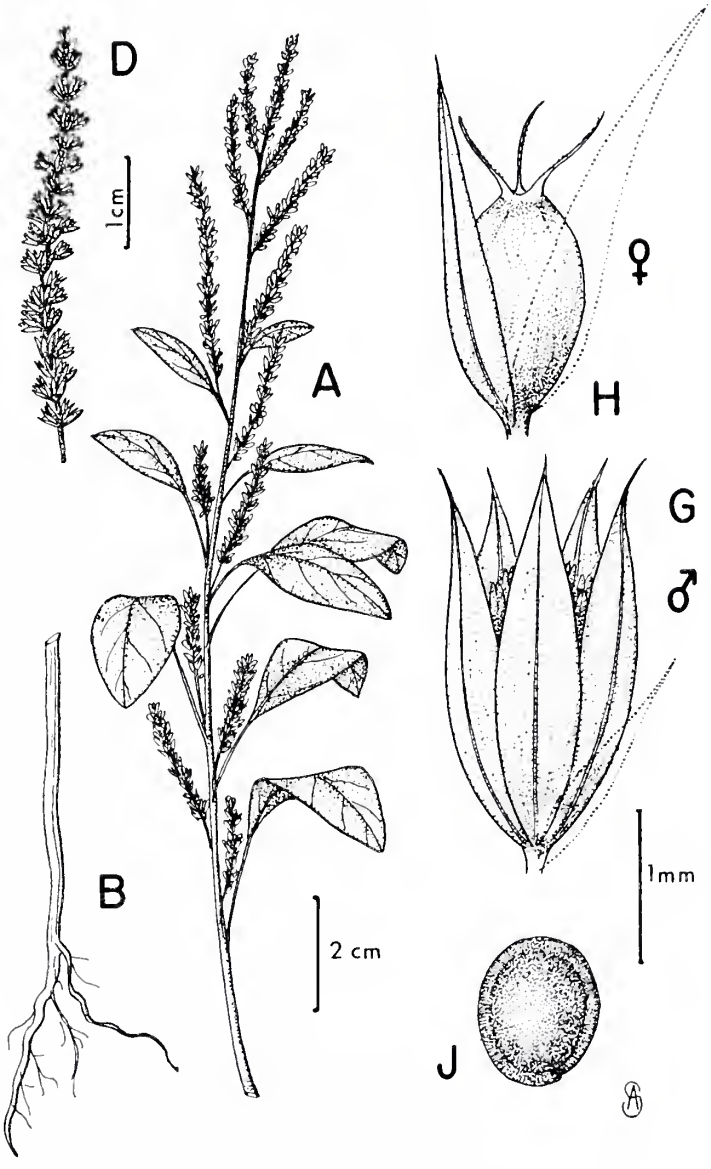
General Distribution: Vermont and Connecticut west to North Dakota south to Nebraska, Tennessee and Louisiana

Description: Plants **dioecious**; **female flowers: stigmas** 2-4, erect or spreading, 0.6-1.0 mm long; **style** absent; **fruit** dry, indehiscent or irregularly bursting, globose to ovoid, 1.0-2.3 mm long, 0.6-1.0 mm broad, sometimes with faint ridges corresponding to the stigmas, smooth or irregularly tuberculate, often reddish; **seed** dark reddish-brown to black, lenticular, round or obovoid in outline, 0.6-1.0 mm in diameter, 0.5-0.6 mm thick, testa smooth; **sepals** usually absent, occasionally 1-2, irregular, rudimentary, 0.6-1.0 mm long, 0.2-0.4 mm broad; **bracts** lanceolate or subulate, 1.2-1.6 mm long, 0.3-0.6 mm broad, acuminate to attenuate, midrib excurrent far beyond the lamina tip as a rigid, sharp point; **male flowers: stamens** 5; **filaments** membranaceous, 1.0-1.2 mm long; **anthers** ellipsoid, yellow, 1.1-1.5 mm long; **sepals** 5, oblong to ovate, 2.5-3.0 mm long, 0.5-0.7 mm broad, the inner ones obtuse or emarginate, the outer acuminate, midveins narrow, excurrent; **bracts** 1.0-1.5 mm long, 0.4-0.6 mm broad, midrib very slender, excurrent; **female inflorescences** terminal and axillary, usually leafy spikes, 2-10 cm long, 5-10 mm broad (occasionally glomerules are found in leaf axils); **male inflorescences** terminal and axillary spikes, 3-14 cm long, 4-12 mm broad, and occasional glomerules clustered in the axil of leaves; **glomerules** unisexual, sessile, the pistillate ones usually spaced along rachis without reduced leaves, the staminate ones usually densely clustered; **leaves** glabrous, the blades extremely variable in size and shape, broadly ovate to lanceolate or the uppermost lance-linear, 1-15 cm long, 0.5-5 cm wide, apex usually acute to acuminate,

sometimes obtuse, narrowed toward the obtuse, often emarginate tip, the base obtuse or cuneate; **petioles** slender, 1-7 cm long, glabrous; **stems** stout, prostrate, ascending or erect, 1-30 dm tall, smooth or sulcate, green or tinged with red, with ascending branches; **root system** annual with a long, thin, often branched taproot (2n = 32, 64).

Infraspecific Variation: Prostrate plants with small, spatulate leaves and poorly developed inflorescences (thyrses) have been separated as var. *prostrata* Uline & Bray. This variety is, apparently, merely a late-autumn form of the typical variety, not a genotypically distinct entity (Sauer, 1955).





4. *Amaranthus rudis* Sauer

Common Name: Water-hemp

Type Description: Sauer, Madroño, vol. 21, p. 428, 1972

Synonyms: *Acnida tamariscinus* Nutt., *Amaranthus tamariscinus* (Nutt.) Wood

Origin: Native to central North America

Habitats: Margins: river floodplains, streambanks, sandbars, muddy lakeshores, edges of ponds and marshes; weedy on roadsides, railroad right-of-ways, and in fields and gardens

Habit: Erect, annual herbs

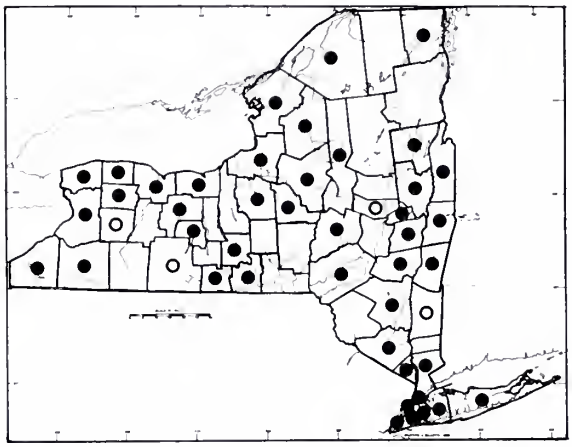
Flowering: August

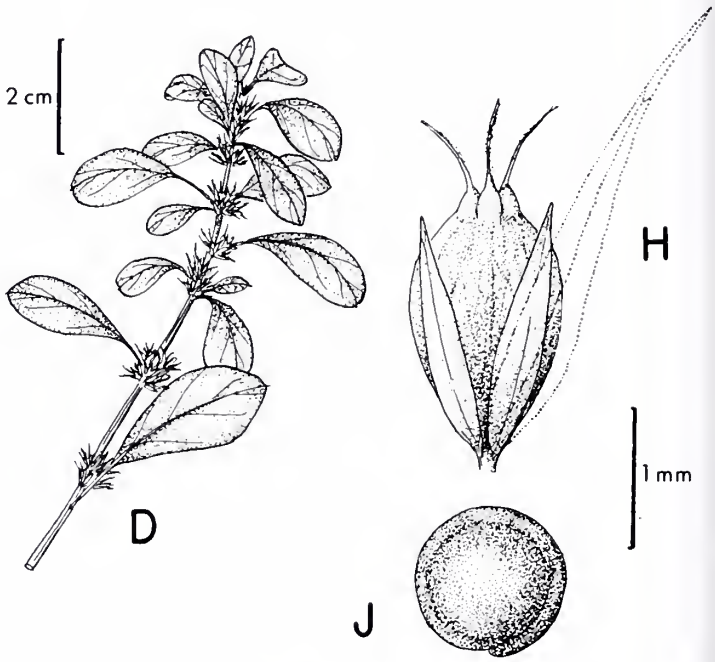
Fruiting: August-October

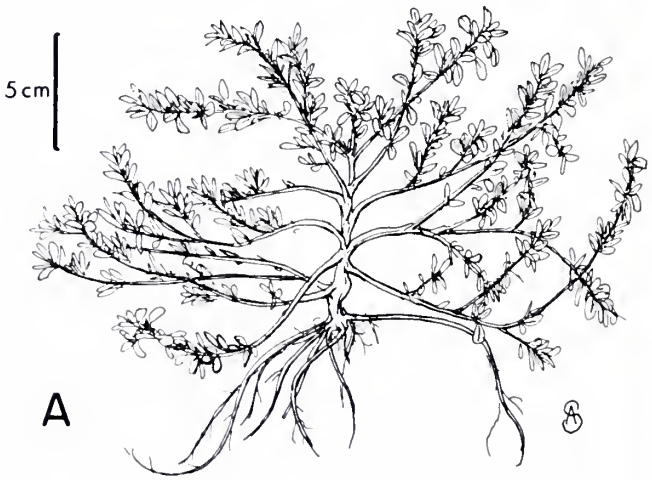
General Distribution: Native from Wisconsin to North Dakota south to Texas and Louisiana, widely introduced *i.e.*: West Virginia, California, New York; also naturalized in Eurasia

Description: Plants **dioecious**; **female flowers**: **stigmas** 3-4, erect to spreading, 0.8-1.0 mm long; **style** absent; **fruit** dry, circumscissile, globose to ovoid, 1.2-1.6 mm long, 0.9-1.1 mm broad, smooth to rugose or tuberculate, sometimes with faint ridges of tubercles corresponding to the stigmas, often reddish; **seed** dark reddish-brown to black, lenticular, round in outline, 0.9-1.1 mm in diameter, 0.4-0.5 mm thick, testa smooth; **sepals** 1-2 (-3) the shorter sepal rudimentary, 0.3-1.0 mm long, ca. 0.3 mm broad, the longer narrowly lanceolate, acuminate, midvein sometimes branched, excurrent, 1.3-2.0 mm long, 0.3-0.4 mm broad; **bracts** linear to lanceolate, 1.8-2.2 mm long, 0.3-0.5 mm broad, attenuate with a stout, excurrent midrib; **male flowers: stamens**

5; **filaments** membranaceous, 1.2-2.5 mm long; **anthers** ellipsoid, yellow, 1.5-1.7 mm long; **sepals** 5, oblong to ovate, inner sepals 2.2-2.5 mm long, 0.6-0.7 mm broad, obtuse or emarginate, outer sepals 2.6-3.1 mm long, 0.6-0.8 mm broad, acuminate, with a conspicuous, excurrent midvein; **bracts** lanceolate, 1.0-1.5 mm long, 0.2-0.6 mm broad, with moderately heavy, excurrent midrib; **female inflorescences** terminal and axillary, usually leafy spikes, 3-40 cm long, 6-15 mm broad; **male inflorescences** terminal and axillary, usually leafy spikes, 5-20 cm long, 8-10 mm broad; **glomerules** unisexual, sessile, 3-5 mm broad; **leaves** oblong to lance-oblong, sometimes lanceolate or ovate, 1-10 cm long, 0.4-3.5 cm broad, rounded or obtuse at the apex, acute to attenuate at the base, upper leaves much-reduced and narrowly oblong, glabrous; **petiole** slender, 0.6-5.0 cm long, glabrous; **stems** stout, erect or ascending, 5-20 dm tall, striate-angulate or smooth, green or glaucescent, unbranched, or usually with ascending branches, glabrous or nearly so; **root system** annual with taproot (2n = 32, 48).







5. *Amaranthus albus* L.

Common Names: Tumbleweed, Tumbleweed-amaranth

Type Description: Linnaeus, Syst. Nat., ed. 10, II, p. 1268, 1759

Synonym: *Amaranthus graecizans* of American authors *pro parte*, not L.

Origin: Native to central North America

Habitats: Fields, roadsides, along railroad tracks, weedy in waste areas and rarely naturalized along shores; in its native range also in dry prairies and stream valleys

Habit: Erect, annual herbs

Flowering: June-August

Fruiting: August-October

General Distribution: Nova Scotia to British Columbia south to Mexico; adventive in eastern North America, Europe, Asia, Africa and South America

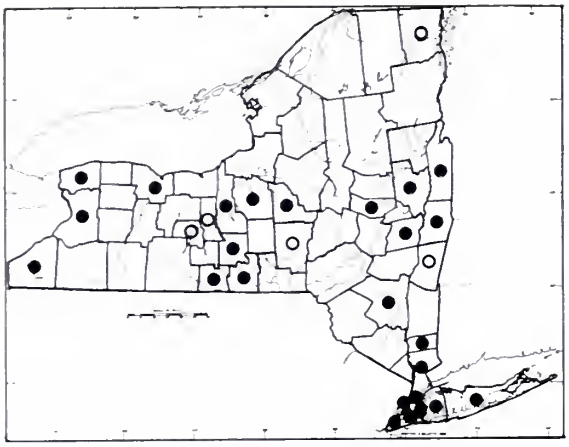
Description: Plants **monoecious**; **female flowers: stigmas** 3, erect, 0.4-0.7 mm long, swollen at base; **style** absent; **fruit** dry, circumscissile, obovoid to subglobose, often with transverse ridges near the septum, 0.9-1.5 mm long, 0.9-1.1 (-1.3) mm broad, rugose, stramineous to dark, gray-brown, sometimes tinged with red; **seed** dark reddish-brown, lenticular, round in outline, 0.8-

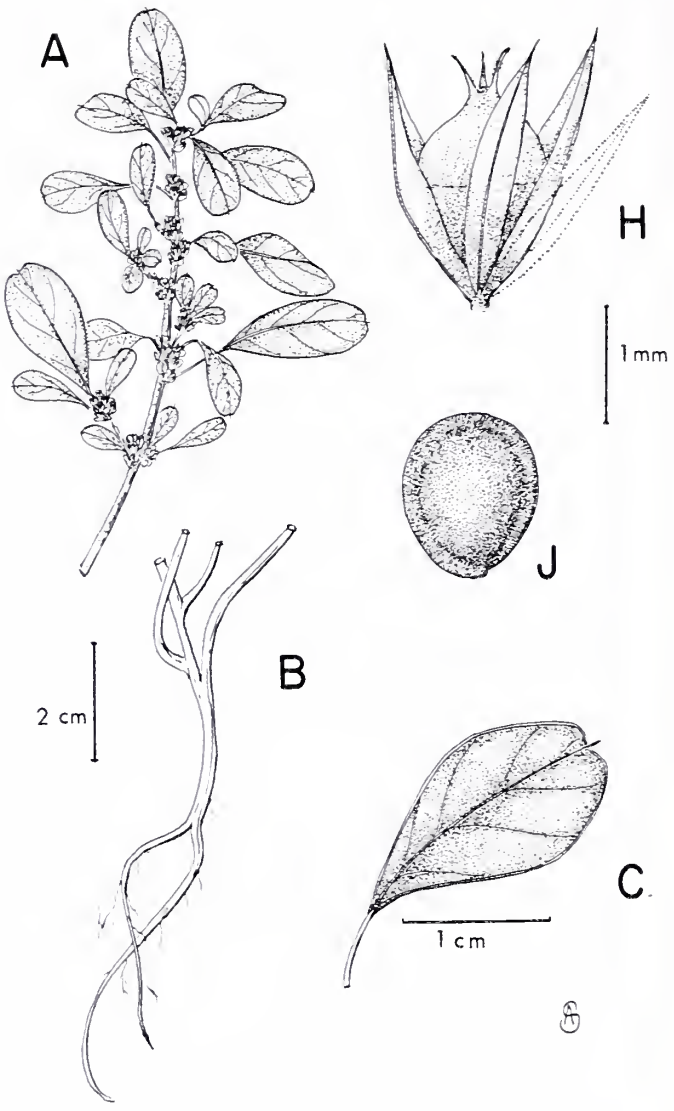
.0 (-1.2) mm in diameter, 0.5-0.6 mm thick, testa smooth; **sepals** 3, oblong to linear, acute to acutish, 1-nerved, the nerve not xcurrent, green along the nerve, often tinged with red, 0.8-1.2 mm long, 0.3-0.5 mm broad; **bract** oblong-lanceolate, 2.0-2.6 mm ong, 0.3-0.6 mm broad, acuminate, midrib excurrent into a pungent point, spreading; **male flowers: stamens** 3; **filaments** mem-ranaceous, 0.5-1.0 mm long; **anthers** ellipsoid, light yellow, 0.5-0.8 mm long; **sepals** 3, oblong, cuspidate, 1.2-2.3 mm long; **ract** lanceolate; **inflorescences** of axillary glomerules; **glomerules** bisexual, sessile, 2-3 mm in diameter; **leaves** elliptic to blong, spatulate or obovate, 0.5-4.2 (-7) cm long, 0.4-2.3 cm broad, larger leaves usually early deciduous, obtuse to retuse at the pex, conspicuously mucronate, cuneate at the base, conspicuously veined, veins whitish beneath, glabrous; **petioles** slender, 0.5-.5 (-5) cm long, glabrous; **stems** stout, erect, 3-12 dm tall, striate, whitish, glabrous or sparingly puberulent or villous, especial-y near the ends, densely branched, the branches ascending or divaricate; **root system** annual with a taproot (2n = 32).

nfraspecific Variation: In our range, plants are pyramidal, but in the western United States the plants often have a spherical to void "tumbleweed" shape. Red-tinted plants have been separated as forma *rubricundus* (Thell.) Priszter.

mportance: This species is a common weed in many parts of the world, becoming a nuisance where windblown aggregations of ne dead plants collect massively.

Nomenclatural Note: This species has long been known under the name *A. graecizans* L., but Thellung (Ascherson & Graebner, 919) showed that *A. graecizans* is exclusively a European plant. *Amaranthus graecizans* can be distinguished from *A. albus* by s short bracts and from *A. blitoides* S. Wats. by its 3 sepals, which are shorter than the fruit. No true *A. graecizans* from North America has been seen.





6. *Amaranthus blitoides* S. Wats.

Common Names: Prostrate Pigweed, Tumbleweed

Type Description: S. Watson, Proc. Am. Acad., vol. 12, p. 273, 1877

Synonym: *Amaranthus graecizans* of American authors *pro parte*, not L.

Origin: A native of western North America

Habitats: Pastures, fields, roadsides, railroad tracks, dumps and other waste areas; in its native range also in dry prairies and stream valleys

Habit: Spreading, annual herbs

Flowering: July-early September

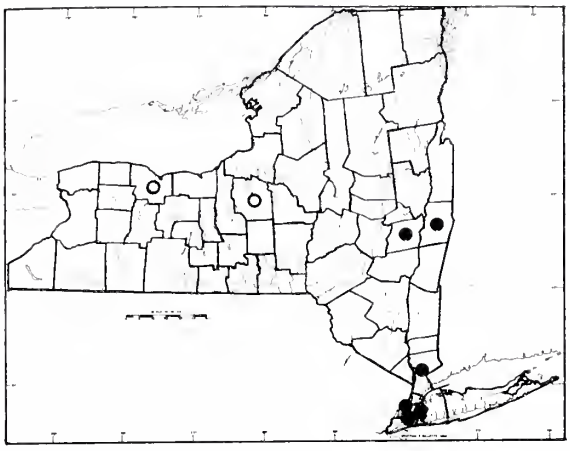
Fruiting: August-October

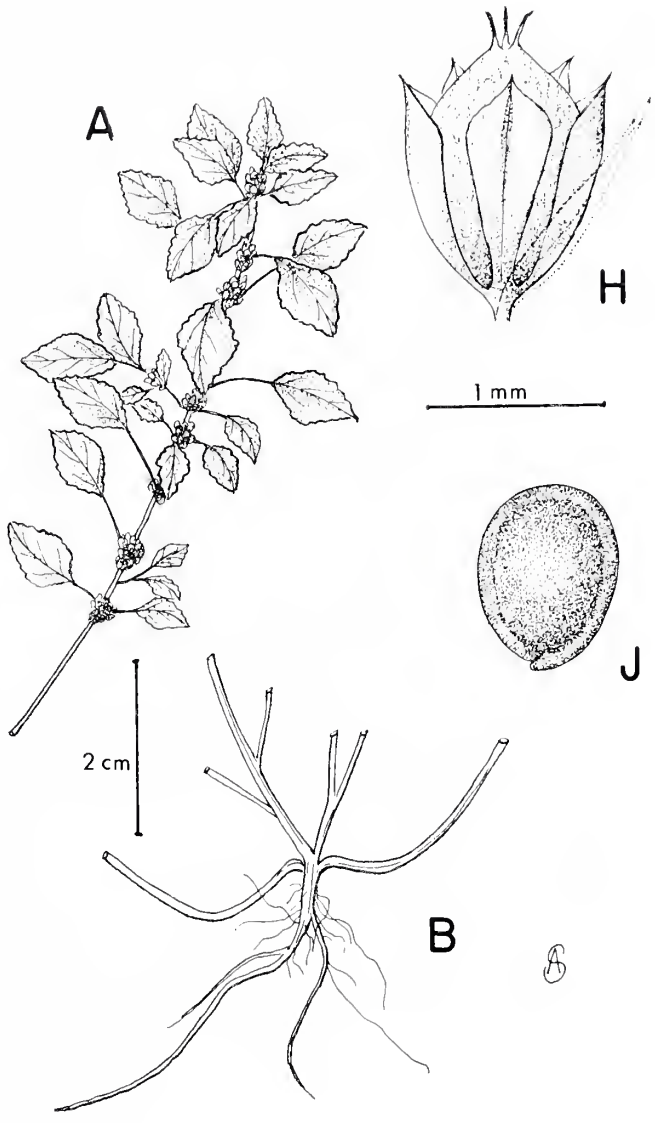
General Distribution: Manitoba to British Colombia south to California and Texas, adventive eastward to the Atlantic coast, Mexico, West Indies and Eurasia

Description: Plants **monoecious**; **female flowers: stigmas** 3, spreading, 0.5-0.7 mm long, swollen at base; **style** absent; **fruit** dry, circumscissile, obovoid to subglobose, 1.5-2.1 mm long, 1.4-1.8(-2) mm broad, usually smooth, stramineous, sometimes tinged with red; **seed** black, lenticular, round in outline, 1.3-1.6 (-1.8) mm in diameter, 0.9-1.0 mm thick, testa smooth; **sepals** 4-5, oblong to narrowly oblong, acuminate, 1-nerved, green along the nerve, 1.2-2.7 mm long, 0.5-0.7 mm broad; **bract** oblong to lanceolate, 1.0-2.5 mm long, 0.4-0.6 mm broad, acute to acuminate, midrib excurrent into a pungent point; **male flowers: stamens** 3; **filaments** membranaceous, 0.7-1.7 mm long; **anthers** ellipsoid, light yellow, 1.0-1.1 mm long; **sepals** 4-5, oblong, acute, 1.3-2.0 mm long, 0.4-0.6 mm broad; **bract** oblong to lanceolate, acute to acuminate, 1.5-2.2 mm long, 0.4-0.9 mm broad; **inflorescences** of axillary glomerules; **glomerules** bisexual, sessile, 3-5 mm in diameter; **leaves** obovate to oval, spatulate or elliptical, 0.8-2.3 (-4) cm long, 0.2-1.4 cm broad, apex rounded to acute, base cuneate to attenuate, conspicuously veined, veins whitish beneath, the smaller leaves with whitish margins, glabrous; **petioles** stout, 0.2-2.0 cm long, glabrous; **stems** stout, prostrate, 1.1-6.0 dm long, smooth to striate, whitish to pale green, rarely tinged with red, glabrous or sparingly puberulent, densely-branched; **root system** annual with a taproot ($2n = 32$).

Importance: This species has become a common weed in fields.

Note: See the nomenclatural discussion following *A. albus*.





7. *Amaranthus crispus* (Lesp. & Thév.) Terracc.

Common Name: Crisp-leaved Amaranth

Type Description: Lespinasse & Théveneau, Bull. Soc. Bot. France vol. 6, p. 656, 1859

Synonym: *Euxolus crispus* Lesp. & Thév.

Origin: A native of Argentina

Habitats: Sidewalks, ballast and waste ground about cities

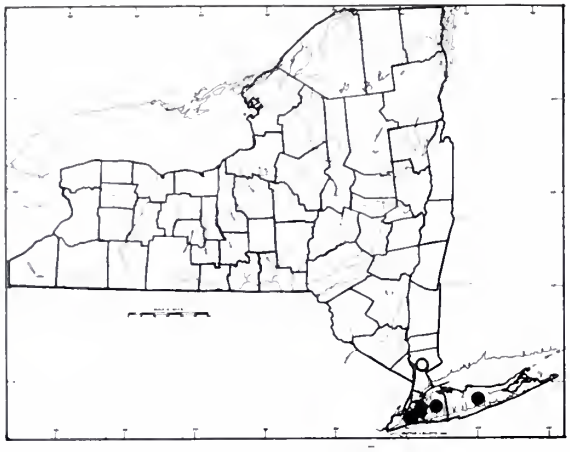
Habit: Spreading, mat forming, annual herbs

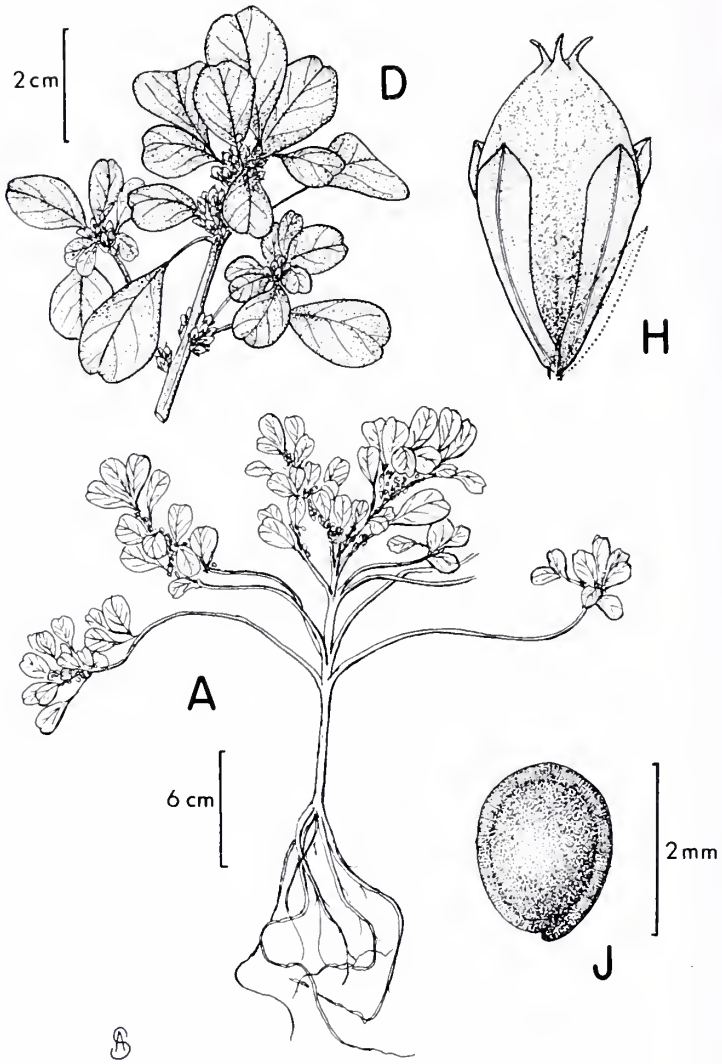
Flowering: July-August

Fruiting: August-October

General Distribution: A native of Argentina, naturalized in southern Europe and in parts of the United States (New York)

Description: Plants **monoecious**; **female flowers**: **stigmas** 3, spreading, 0.4-0.7 mm long; **style** absent; **fruit** indehiscent, ellipsoid, 1.5-2.0 mm long, 0.7-1.0 mm broad, rugose, stramineous; **seed** black to dark reddish-brown, lenticular, obovoid, 0.7-1.0 mm in diameter, 0.4-0.5 mm thick, testa smooth; **sepals** 5, oblong-spatulate, obtuse with 1 white, excurrent nerve, 1.2-1.7 mm long, 0.5-0.6 mm broad; **bract** lanceolate to oblong, 1.0-1.5 mm long, ca. 0.5 mm broad, acute, the midrib excurrent into a pungent point, spreading; **male flowers: stamens** 5; **filaments** membranaceous, 0.4-0.5 mm long; **anthers** ellipsoid, light yellow, 0.6-0.7 mm long; **sepals** 5, oblong, acute, 1.0-1.2 mm long, 0.4-0.8 mm broad; **bract** lanceolate, 1.0-1.1 mm long, 0.3-0.4 mm broad; **inflorescences** of axillary glomerules; **glomerules** bisexual, sessile, 2.5-4.0 mm in diameter; **leaves** rhombic-ovate to oblong, 0.5-1.1 (-2.5) cm long, 3-7 mm broad, apex acute, base cuneate, conspicuously crisped, puberulent beneath, prominently veined, sparsely pubescence; **petioles** stout, 0.2-0.7 cm long, sparsely pubescent; **stems** slender, prostrate, forming mats 2-8 dm in diameter, striate, stramineous, much-branched; **root system** annual with a taproot.





8. *Amaranthus pumilus Raf.*

Common Names: Seabeach Amaranth, Coast Amaranth

Type Description: Rafinesque, Med. Reps. II., vol. 5, p. 360, 1808

Synonym: *Euxolus pumilus* (Raf.) Chapm.

Origin: Native to the Mid-Atlantic Coast of North America

Habitats: Sandy sea beaches and inlets, storm washouts, sometimes within the tidal zone, but often inhabiting wrack or drift-lines at the high-water mark

Habit: Fleshy, prostrate to ascending, annual herbs

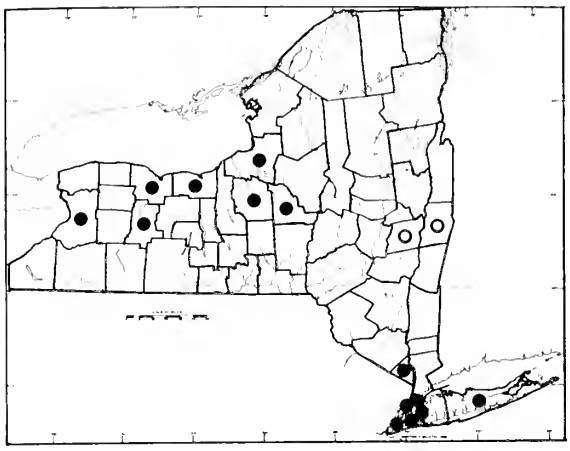
Flowering: July-August

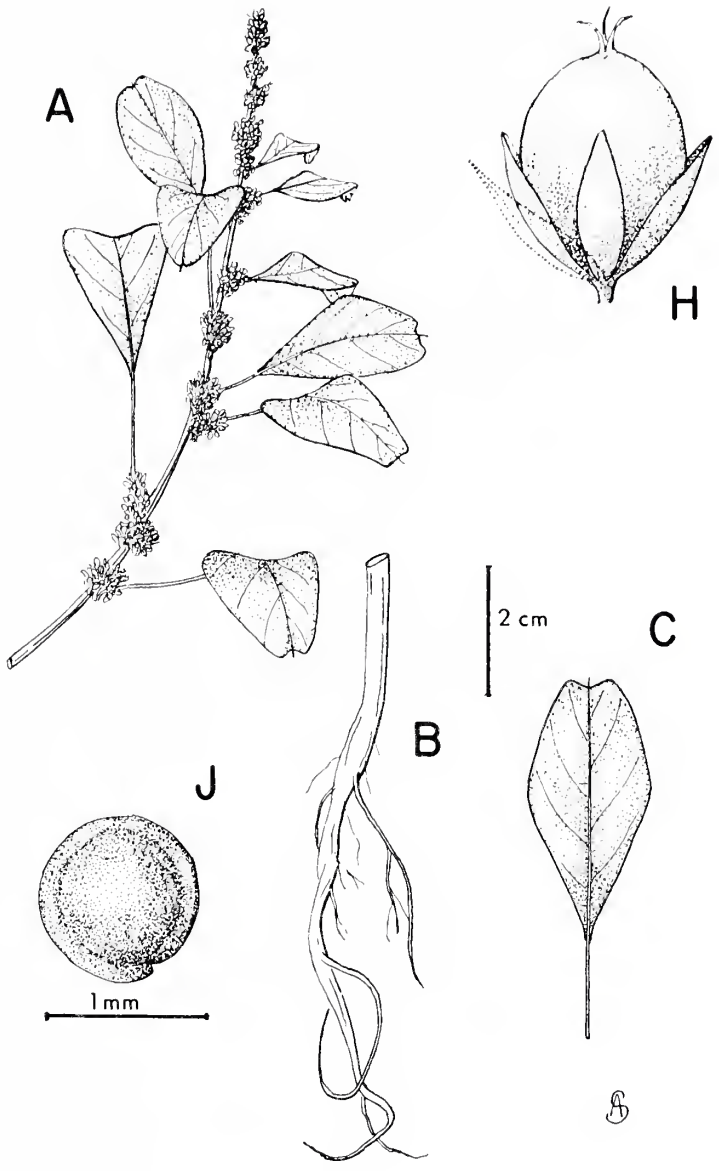
Fruiting: August-September

General Distribution: The Atlantic Coast, primarily on barrier islands, from Rhode Island and New York south to South Carolina; a "fugitive" species that does not necessarily occur throughout its potential range at any given time

Rarity Status: This species was thought to be extirpated in New York State until the summer of 1990, following a Carolina hurricane, when populations showed up on the beaches of three Long Island counties. The New York Natural Heritage Program ranks the species G2 S1, globally imperiled throughout its range, and critically imperiled in New York State. The Federal status of the species is C2, making it a candidate for listing pending further study.

Description: Plants **monoecious; female flowers: stigmas** 3, spreading, 0.6-0.7 mm long; **style** absent; **fruit** fleshy, indehiscent, ovoid to obovoid, 2.5-4.0 mm long, 2.0-2.6 mm broad, rugose, faintly 5-ribbed, stramineous; **seed** dark reddish-brown to black, lenticular, oval, 1.7-2.2 mm in diameter, 1.1-1.3 mm thick, testa smooth; **sepals** 5, narrowly oblong-spatulate, obtuse, 1-nerved, green along the nerve, 2.5-3.0 mm long, 0.9-1.1 mm broad; **bract** lanceolate, 0.9-1.2 mm long, 0.2-0.3 mm broad, acute, midrib not excurrent; **male flowers: stamens** 5; **filaments** membranaceous, 1.0-1.1 mm long; **anthers** ellipsoid, light yellow, 1.0-1.5 mm long; **sepals** 5, oblong, obtuse, 1.6-2.0 mm long, 0.9-1.1 mm broad; **bract** lanceolate, 0.9-1.2 mm long, 0.2-0.3 mm broad; **inflorescences** of axillary glomerules; **glomerules** bisexual, sessile, 5.5-11.0 mm in diameter; **leaves** clustered at the ends of the branches, obovate to suborbicular, 0.8-2.0 cm long, 0.7-1.4 cm broad, apex rounded or commonly emarginate, base rounded to attenuate, decurrent, glabrous, fleshy, prominently veined, the veins often red-purple; **petioles** stout, 0.2-1.1 cm long, glabrous; **stems** stout, succulent, prostrate or ascending, 0.4-3.0 dm tall, striate, greenish or red to stramineous, densely branched, the branches ascending or divaricate; **root system** annual with a taproot.





9. *Amaranthus blitum* L.

Common Names: Livid Amaranth, Purplish Amaranth

Type Description: Linnaeus, Species Pl. II, p. 990, 1753

Synonyms: *Amaranthus lividus* L., *A. ascendens* Loisel.

Origin: A native of tropical America

Habitats: Weedy in waste areas, gardens, dumps, shores, and along railroad tracks

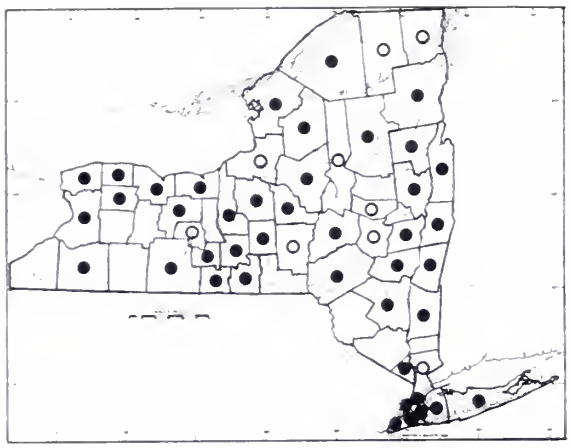
Habit: Spreading, succulent herbs

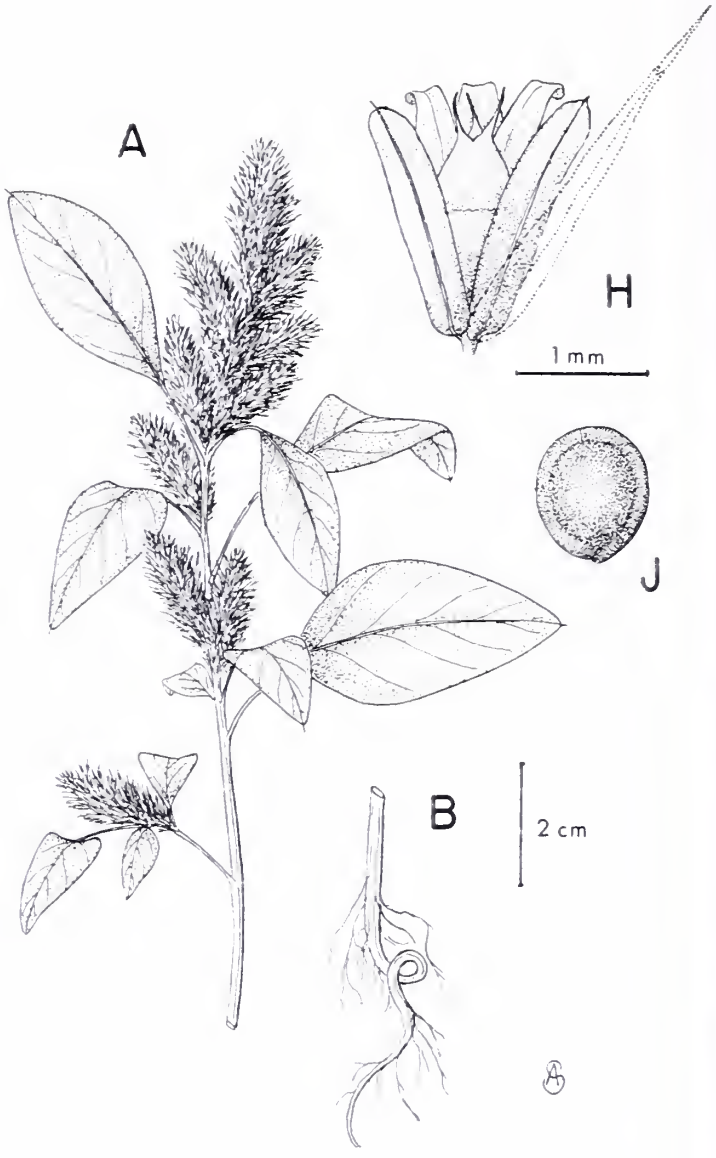
Flowering: June-August

Fruiting: August-October

General Distribution: Widespread in the tropics and warm-temperate areas; in North America, naturalized from Quebec and Ontario south to Maryland

Description: Plants **monoecious**; **female flowers: stigmas** 3, erect or spreading, 0.1-0.3 mm long; **style** absent; **fruit** dry, indehiscent, globose to ovoid, 1.2-2.0 mm long, 1.2-1.9 mm broad, smooth, green; **seed** dark reddish-brown to black, lenticular to rotund, 0.8-1.0 mm in diameter, 0.5-0.6 mm thick, testa smooth; **sepals** 3, oblong to oblanceolate, obtuse to acute, with a single midnerve, 0.7-1.4 mm long, 0.4-0.5 mm broad; **bract** oblanceolate, 0.7-1.3 mm long, ca. 0.3 mm broad, obtuse to acute, the midrib not excurrent; **male flowers: stamens** 3; **filaments** membranaceous, ca. 1 mm long; **anthers** ellipsoid, light yellow, 0.5-0.6 mm long; **sepals** 3, lanceolate, acuminate, 0.9-1.2 mm long, 0.3-0.5 mm broad; **bract** lanceolate, acuminate, 0.5-0.7 mm long, ca. 0.3 mm broad; **inflorescences** terminal and axillary, leafless spikes, 2-7 cm long, 5-8 mm broad (often with glomerules in the leaf axils); **glomerules** bisexual, sessile, 3-7 mm in diameter; **leaves** rhombic-ovate to broadly ovate, 1-8 cm long, 0.7-4.5 cm broad, glabrous, apex deeply emarginate, the lobes broad and rounded, base cuneate to rounded; **petioles** slender, 0.5-6.0 cm long, glabrous; **stems** slender to stout, succulent, erect to prostrate, forming mats 5-20 dm wide, striate, green, or with a reddish tinge, glabrous; **root system** annual with a taproot (2n = 34).





10. *Amaranthus retroflexus* L.

Common Names: Pigweed, Green Amaranth, Wild Beet, Redroot Amaranth, Redroot Pigweed

Type Description: Linnaeus, Species Pl. II, p. 991, 1753

Synonym: *Galliaria scabra* Bub.

Origin: A native of the northeastern United States

Habitats: Waste ground, cultivated ground, along railroad tracks, ballast, stream banks and stony beaches

Habit: Erect, annual herbs

Flowering: July-August

Fruiting: August-October

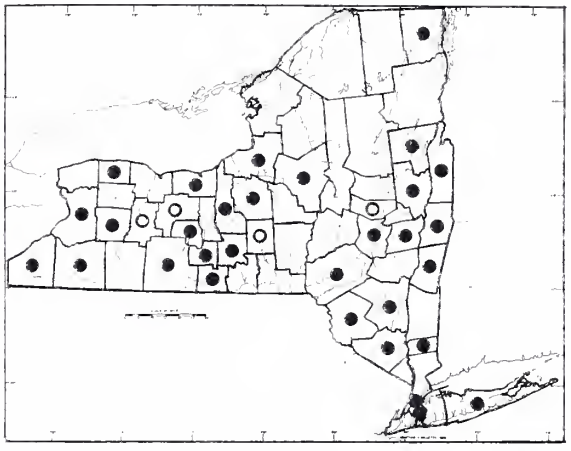
General Distribution: Nova Scotia to the Northwest Territories south to Mexico, now spread throughout temperate regions of the world

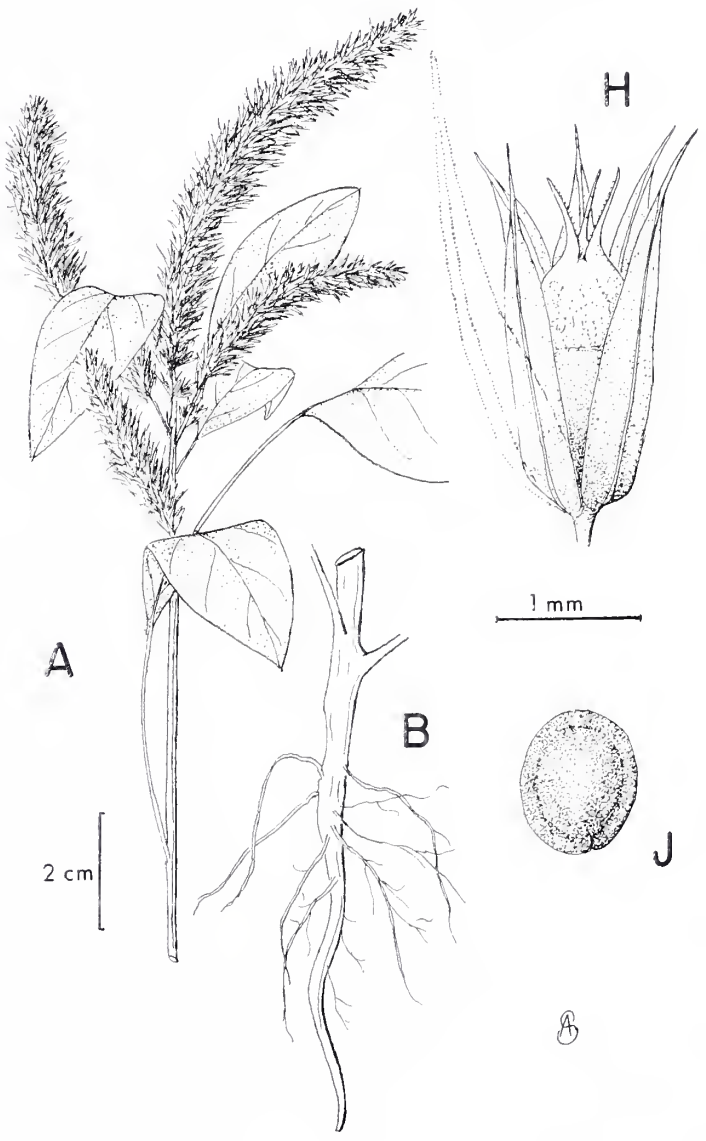
Description: Plants **monoecious**; **female flowers: stigmas** 3, erect, 0.7-0.9 mm long; **style** absent; **fruit** circumscissile, subglobose, 1.2-1.8 mm long, 1.0-1.3 mm broad, rugose above, stramineous; **seed** black and lustrous, lenticular, obovate or oval, 0.9-1.2 mm in diameter, 0.5-0.6 mm thick, testa smooth; **sepals** 5, linear-oblong, rounded or truncate, apex usually emarginate, often mucronate, whitish except for the green midnerve, 2.2-3.2 mm long, 0.7-1.0 mm broad; **bract** lanceolate to ovate, 3.7-7.0 mm long, 0.7-1.0 mm broad, tapering to a stout subulate tip; **male flowers: stamens** 5; **filaments** membranaceous, 0.9-1.5 mm long; **anthers** ellipsoid, light yellow, 0.9-1.0 mm long; **sepals** 5, ovate-oblong to lanceolate, 2.0-2.6 mm long, 0.6-0.9 mm broad, acute to acutish, the midnerve with an excurrent tip ca. 3 mm long; **bract** narrowly lanceolate, 3.7-7.0 mm long, 0.7-1.0 mm broad, acuminate; **inflorescences** terminal compound spikes and axillary spikes, 1.0-4.5 (-8) cm long, 0.7-1.5 cm broad, occasionally with glomerules in the axils of the upper leaves; **glomerules** bisexual, subsessile, tightly congested and not distinct; **leaves** lanceolate, lanceolate-ovate to obovate-oblanceolate, 2-12 cm long, 1.5-7.0 cm broad, apex acute to obtuse, often emarginate, base acute or obtuse, sometimes crisped, glabrous above, more or less villous to puberulent beneath, prominently veined, the veins white beneath; **petioles** slender, 1.5-8.0 cm long, usually villous; **stems** stout, erect or ascending, 3-30 dm tall, obtusely angled, green or whitish, abundantly villous at least above; **root system** annual with a taproot ($2n = 34$).

Infraspecific Variation and Hybridization: Several varieties and subvarieties have been named in Europe, including plants with red-tinted stems and inflorescences, called subvar. *rubricaulis* Thell. Those plants with longer bracteoles on the female flowers 1.3-1.5 times as long as the flowers (a common situation in NY) have been called *A. retroflexus* var. *delilei* (Richter & Loret)

Thell., the typical variety has longer bracteoles, twice as long as the female flowers. These proposed taxa merge completely, show no other distinctions, and are, therefore, not assigned taxonomic rank in this treatment. *Amaranthus retroflexus* hybridizes with several other species, most commonly *A. hybridus* and *A. powellii*. Introgression of *A. retroflexus* genes into *A. hybridus* is reported as one reason for well-known difficulties in determining the identity of *A. hybridus* plants. In New York State, one should have little difficulty distinguishing most individuals of these species from those of *A. retroflexus*, but there are specimens that show traits of both species.

Importance: Under certain soil and moisture conditions, *Amaranthus retroflexus* accumulates nitrates and may retain them in amounts that are poisonous to livestock. The stems and branches are the primary nitrate storage organs. In some areas, however, the species has been reported as palatable to sheep as oats and is said to have nutrient-composition and digestibility characteristics equivalent to those of high-quality alfalfa. The species is listed as a noxious weed in a number of states, and it may, also, be an alternate host for a number of detrimental crop diseases. It is known to reduce some crop yields significantly through competition.





11. *Amaranthus powellii* S. Watson

Common Names: Amaranth, Powell's Amaranth

Type Description: S. Watson, Proc. Amer. Acad. 10: 347, 1875

Origin: Native to the western United States

Habitats: Usually a weed of cultivated fields, but also found on waste ground, roadsides, along railroad tracks and in dumps

Habit: Erect, annual herbs

Flowering: July-August

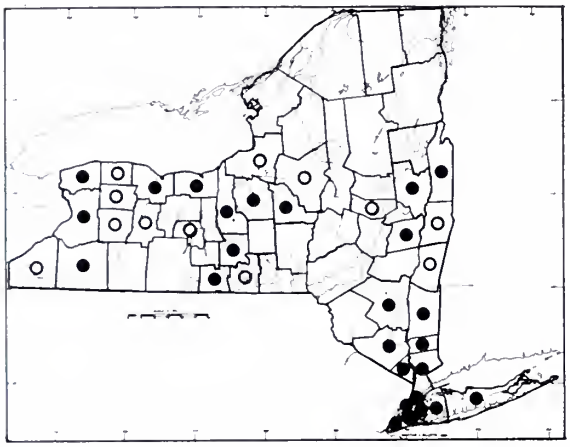
Fruiting: August-October

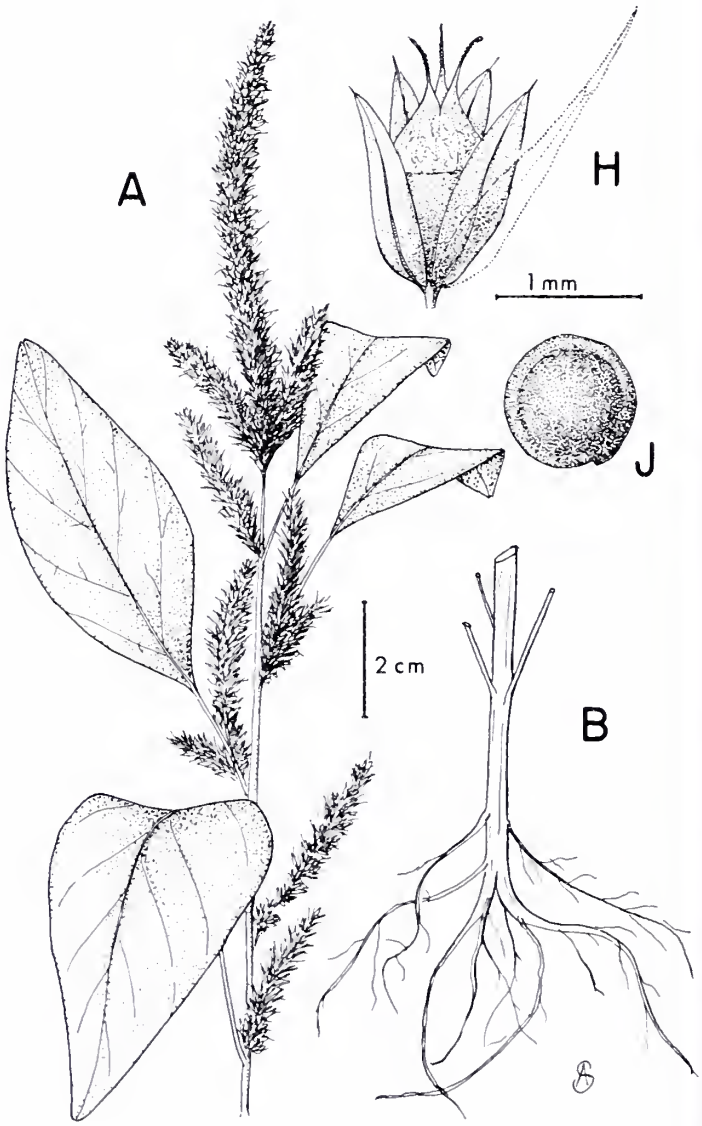
General Distribution: Prince Edward Island to British Columbia south to Mexico, Texas and Pennsylvania

Description: Plants **monoecious**; **female flowers: stigmas** 3, spreading, 0.5-0.7 mm long; **style** absent; **fruit** circumscissile, oval, 1.8-2.2 mm long, 1.1-1.4 mm broad, rugose above, stramineous; **seed** reddish-brown.

to usually black, lenticular, round in outline, 1.0-1.3 mm in diameter, 0.5-0.6 mm thick, testa smooth; **sepals** 3-5, oblong or linear-oblong, acute, 1-nerved, the nerve usually excurrent as a spinose tip, 1.5-3.0 mm long, 0.5-0.6 mm broad; **bract** linear-lanceolate, longer bracts 4.0-7.5 mm long, 0.9-1.2 mm broad, attenuate with a rigid spinose tip; **male flowers: stamens** 3 (-5); **filaments** membranaceous, ca. 1 mm long; **anthers** ellipsoid, light yellow, 0.5-0.6 mm long; **sepals** 5, narrowly oblong to ovate, 2-3 mm long, 0.5-0.6 mm broad, 1-nerved, the nerve usually excurrent; **bract** linear-lanceolate, 4-7 mm long, 0.9-1.1 mm broad; **inflorescence** a terminal spike or compound spike, 1.0-4.5 cm long, 1.0-1.8 cm broad; **glomerules** bisexual, subsessile, closely congested and not measurable; **leaves** rhombic-ovate to lanceolate, or deltoid-elliptic, 1.5-10.0 (-12) cm long, 0.5-4.0 cm broad, apex acute to rounded, sometimes emarginate, base cuneate to rounded, glabrous or sparsely pubescent; **petioles** slender, 1-5 cm long, glabrous or sparsely pubescent; **stems** stout, erect, 3-20 dm tall, striate, green or whitish, glabrous below, usually villous above; **root system** annual with a taproot (2n = 34).

Interspecific Variation and Hybridization: This species is reported to hybridize with *A. retroflexus*, *A. tuberculatus*, and *A. hybridus*. Sauer and Davidson (1961) reported sterile hybrids between *A. retroflexus* and *A. powellii* only occurring since 1922. Hybrids involving *A. powellii* should be expected in New York, particularly since *A. powellii* is becoming more widespread.





12. *Amaranthus hybridus* L.

Common Names: Green Amaranth, Pigweed, Wild Beet, Prince's-feather, Spleen Amaranth

Type Description: Linnaeus, Species Pl. II, p.990, 1753

Synonyms: *Amaranthus chlorostachys* Willd., *A. incurvatus* Ti. ex Gren. & Godr., *A. patulus* Berol.

Origin: A native of the New World, probably the tropics

Habitats: Waste areas, fields, along railroad tracks, river flats, roadsides, ballast, dumps, weedy areas and cultivated soils

Habit: Erect, annual herbs

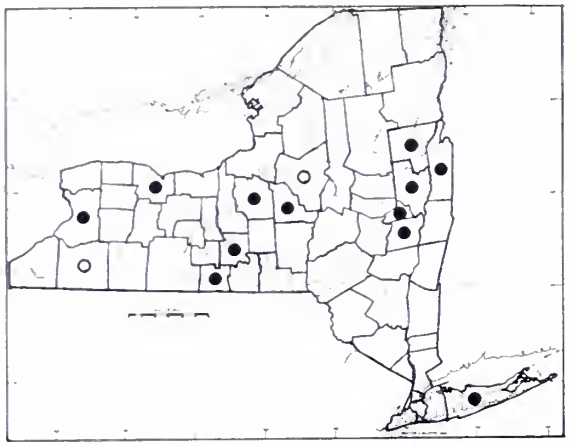
Flowering: June-August

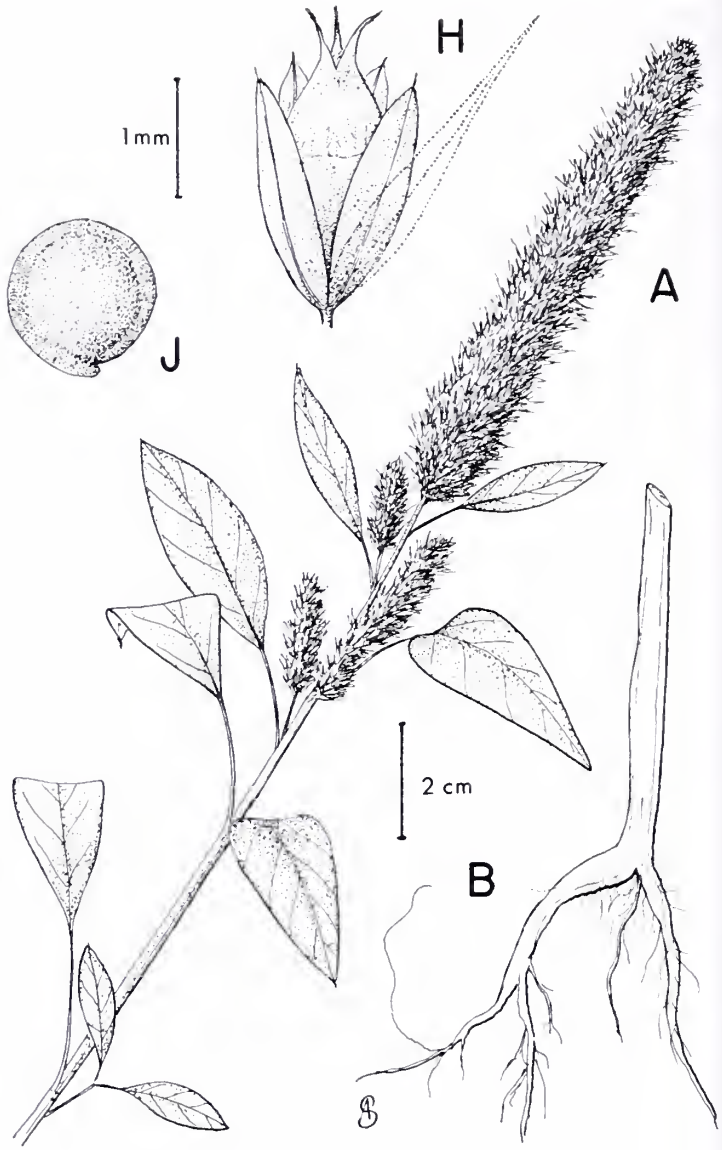
Fruiting: August-November

General Distribution: Quebec to Manitoba south to Mexico, Central and South America

Description: Plants **monoecious**; **female flowers: stigmas** 3, erect or spreading, 0.3-0.5 mm long; **style** absent; **fruit** obovoid, circumscissile, 1.2-2.1 mm long, 0.9-1.3 mm broad, usually smooth, stramineous; **seed** black or dark reddish-brown, lenticular, round in outline, 0.8-1.1 (-1.5) mm in diameter, 0.5-0.6 mm thick, testa smooth; **sepals** 5, oblong to ovate or lanceolate, acute, scarious, 1-nerved, the nerve usually excurrent, 1.2-2.1 mm long, 0.4-0.5 mm broad; **bracts** lanceolate to ovate, 2.2-3.4 (-4.2) mm long, 0.6-0.7 mm broad, tapering to short spinose tip; **male flowers: stamens** 5; **filaments** membranaceous, 0.6-1.0 mm long; **anthers** ellipsoid, light yellow, 0.6-0.7 mm long; **sepals** usually 5, narrowly oblong to ovate, acute, 1-nerved, the nerve usually excurrent, 1.7-2.0 mm long, 0.2-0.3 mm broad; **bract** lanceolate to ovate, 2.0-2.7 mm long, 0.4-0.6 mm broad; **inflorescences** terminal compound spikes and axillary spikes, 10-25 cm long, ca. 1 cm broad; **glomerules** bisexual, subsessile, tightly congested and not distinct; **leaves** lanceolate to ovate or rhombic-ovate, 3-15 cm long, 1-7 cm broad, apex acute or rarely rounded, base cuneate or rounded, pubescent beneath or glabrous, prominently veined; **petioles** slender, 1.5-9.0 cm long, pubescent; **stems** stout, erect or ascending, 3-15 (-25) dm tall, striate, pale green, usually tinged with red, rough puberulent below or glabrous, villous above; **root system** annual with a stout taproot ($2n = 32$).

Interspecific Variation and Hybridization: Much of the taxonomic difficulty with the *A. retroflexus*, *A. powellii*, *A. hybridus* complex may be attributed to hybridization. Murray (1940) found little fertility in F1 hybrids, and F2 generation plants are rarely produced; however, hybrids are reported to be common where these species co-occur in nature. In fact, Sauer (1950) suggested that much of the variation reported in *A. hybridus* is the result of introgression from *A. retroflexus*. Intermediate specimens are readily apparent in New York collections. In general, specimens that exhibit mostly *A. hybridus* characters have been treated as *A. hybridus*, a situation complicated by the fact that this species is also reported to hybridize with other members of the genus.





13. *Amaranthus hypochondriacus* L.

Common Name: Prince's-feather

Type Description: Linnaeus, Species Pl. II, p. 991, 1753

Origin: Probably originally native to Mexico, derived from *A. hybridus* or *A. powellii* through selection by man

Habitats: Waste places and cultivated ground

Habit: An erect, annual herb

Flowering: July-August

Fruiting: August-October

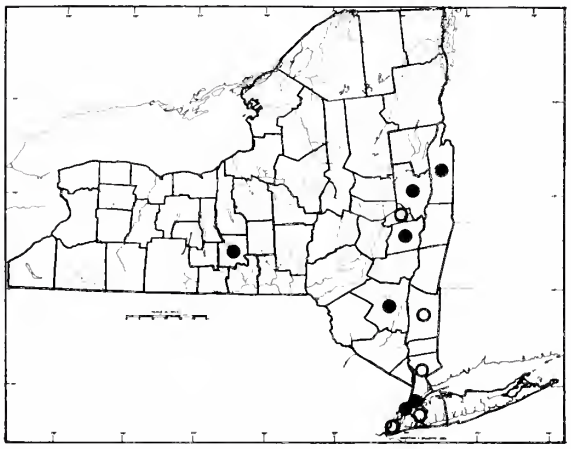
General Distribution: Arizona to Guatemala, now escaping in scattered localities from New York to Wisconsin and Missouri

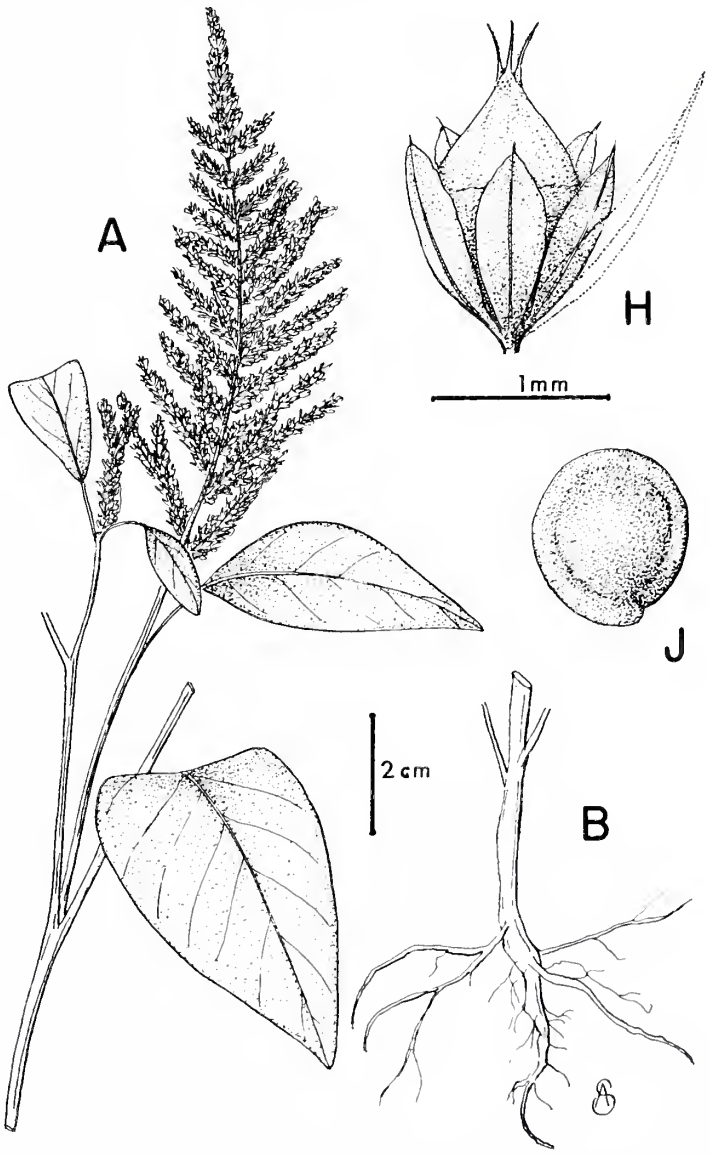
Description: Plants **monoecious**; **female flowers: stigmas** 3, erect or spreading, 0.4-0.6 mm long, thick at base; **style** absent; **fruit** circumscissile, subglobose, 2.0-2.4 mm long, 1.1-1.4 mm broad, often rugose, straminneous to deep red; **seed** black or dark reddish-brown or creamy in cultivated forms, lenticular, round in outline, 1.0-1.3 mm in diameter, 0.8-0.9 mm thick, testa smooth; **sepals** commonly 5, oblong to ovate, acute, 1-nerved, the nerve usually excurrent, 1.7-2.3 mm long, 0.5-0.8 mm broad; **bract** lanceolate to ovate, 2.8-3.4 mm long, 0.8-1.0 mm broad, tapering to short spinose tip; **male flowers: stamens** 5; **filaments** membranaceous, 1.0-1.4 mm long; **anthers** ellipsoid, light yellow, 0.7-0.9 mm long; **sepals** usually 5, narrowly oblong to ovate, 3.0-3.3 mm long, 0.5-0.6 mm broad, acute, 1-nerved, the nerve usually excurrent; **bract** lanceolate to ovate, 2.6-3.0 mm long, 1.0-1.2 mm broad; **inflorescences** terminal, compound spikes, spikes 6-17 cm long, 0.9-1.4 cm broad; **glomerules** bisexual, subsessile, closely congested and not measurable; **leaves** lanceolate to ovate or rhombic-ovate, 3-15 cm long, 1-7 cm broad, apex acute or rarely rounded, base cuneate, pubescent beneath or glabrous, prominently veined; **petioles** slender, 1.5-9.0 cm long, pubescent; **stems** stout, erect or ascending, 3-25 dm tall, striate, pale green, usually tinged with red, rough-puberulent or glabrous below, villous above; **root system** annual with a taproot (2n = 32).

Importance: This species is an important grain amaranth, and is the most prevalent species grown in the United States for Amaranth grain. It is grown more extensively in many parts of the tropics, particularly Mexico and India, where the fruits are toasted, popped like corn, or ground into flour — often mixed with syrup or honey to make candies. Among the Aztecs, this species was a very important ritual plant. Idols were made from a paste composed of ground, toasted amaranth seeds and, according to one report, the blood of human sacrifices. During major religious festivals, such idols were broken into pieces and eaten by the faith-

ful. The Spaniards considered this practice a perverse parody of the Catholic Eucharist and forbade it. Cortez even went so far as to burn all grain amaranth fields.

Interspecific Variation and Hybridization: This species is very similar to *Amaranthus hybridus*, and it is believed to be derived from that species or possibly *A. powellii* through selection as a grain crop. In general, the larger inflorescences, shorter bracts, and thick-based stigmas separate this species from *A. hybridus*, but the plants are often difficult to separate from it in New York, because *A. hypochondriacus* appears to be reverting to its "wild" form after it escapes.





14. *Amaranthus cruentus* L.

Common Names: Blood Amaranth, Purple Amaranth

Type Description: Linnaeus, Syst. Nat. ed. 10, p. 1269, 1759

Origin: Southern Mexico and Guatemala, probably through selective cultivation of *A. hybridus*

Habitats: Waste ground, dumps, cultivated fields and borders

Habit: Erect, annual herbs

Flowering: July-August

Fruiting: August-October

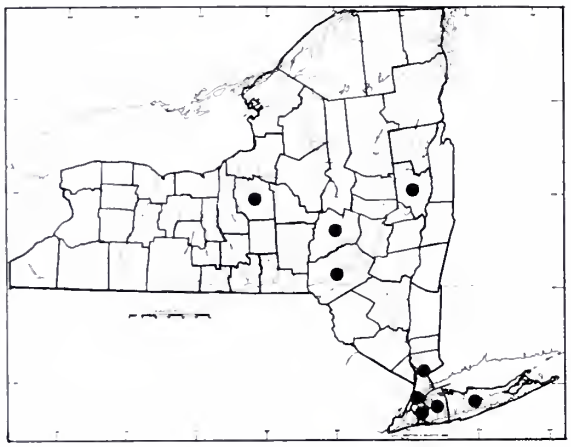
General Distribution: Scattered throughout much of the world particularly in the tropics. In North America, from Quebec to Alberta south to Mexico and Maryland

Description: Plants **monoecious**; **female flowers: stigmas** 3, erect, 0.4-0.5 mm long, slender at base; **style**

absent; **fruit** ovoid to broadly ovoid, circumscissile, 1.4-1.6 mm long, 1.1-1.4 mm broad, smooth to somewhat rugose on the upper half, stramineous or usually red; **seed** black or dark reddish-brown, lenticular, round in outline, 1.0-1.3 mm in diameter, 0.5-0.6 mm thick, testa smooth; **sepals** 5, oblong to narrowly oblong, obtuse to rounded, sometimes erose, the outer ones acute with an excurrent vein, red, reddish-orange or purple or sometimes green or stramineous, the inner ones faintly 1-nerved, not carinate, 1.0-1.7 mm long, 0.3-0.5 mm broad; **bract** lanceolate to ovate, 1.5-2.0 mm long, 0.5-0.9 mm broad, tapering to a short pungent tip; **male flower: stamens** 5; **filaments** membranaceous, 0.9-1.0 mm long; **anthers** ellipsoid, light yellow, 0.5-0.8 mm long; **perianth** of 5 sepals; **sepals** oblong-ovate, 1.0-1.7 mm long, 0.6-0.7 mm broad, acute, 1-nerved, the nerve excurrent; **bract** lanceolate to ovate, 1.2-1.4 mm long, 0.5-0.6 mm broad; **inflorescences** terminal compound spikes, 4-5 (-15) cm long, 4-5 (-12) mm broad, and lateral spikes 1.5-5.0 cm long, 0.3-0.6 mm broad; **glomerules** bisexual, subsessile, closely congested; **leaves** elliptic to ovate-lanceolate or rhombic-ovate, 3-30 cm long, 1.5-10.0 cm broad, apex attenuate or acute, the tip usually obtuse, base acute to attenuate, sparsely pubescent or glabrate; **petioles** slender, 2-20 cm long, often pubescent; **stems** stout, erect, 5-20 dm tall, striate, green or red, usually pubescent, villous near the inflorescence; **root system** annual with a taproot (2n = 32, 34).

Infraspecific Variation: A fairly homogenous species in our area, but intermediates are likely occur where the species grows sympatrically with *A. hybridus*.

Importance: One of the grain amaranths, also cultivated in many parts of the world as a pot herb. It is grown in Latin America and India for the seed, which is used as a grain in baking. The flour produced is high in protein content. It is also grown as an ornamental, a dye plant and a pot herb.



15. *Amaranthus caudatus* L.

Common Names: Purple Amaranth, Love-lies-bleeding

Type Description: Linnacus, Species Pl. II, p. 990, 1753

Origin: The Andes, probably derived from *A. hybridus* through prolonged cultivation and selection

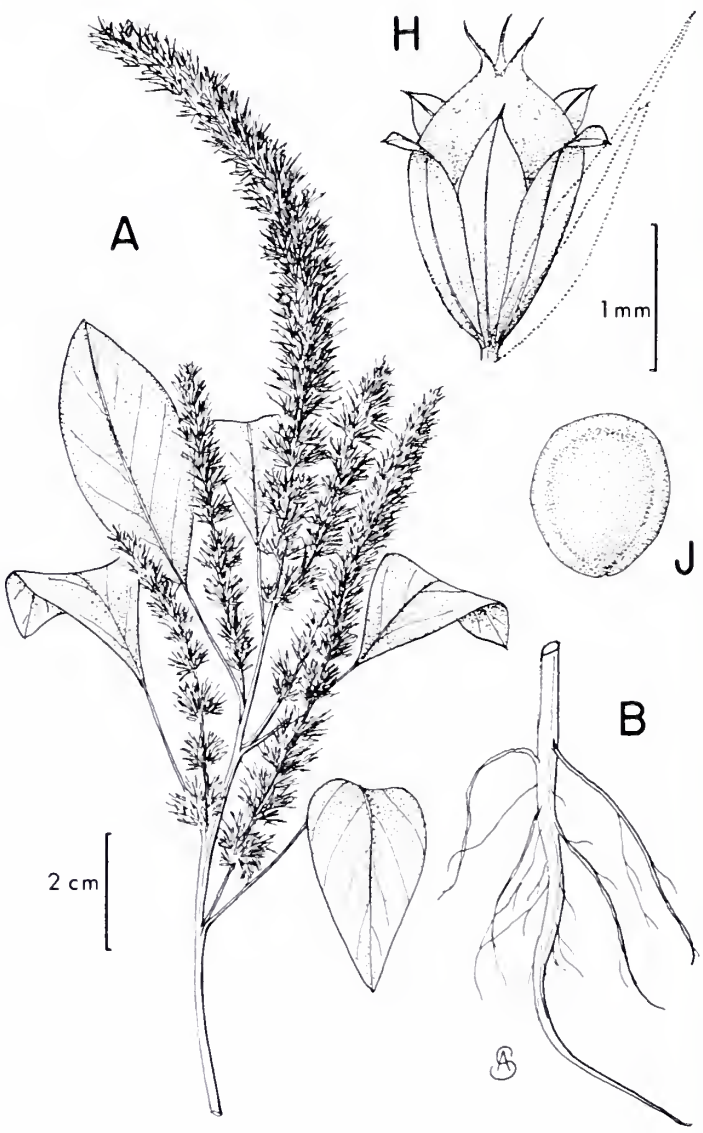
Habitats: Roadsides, gardens, waste places and cultivated ground

Habit: Erect, annual herbs

Flowering: June-August

Fruiting: August-September

General Distribution: South America; naturalized in North America from Quebec to Missouri south to Mexico



Description: Plants **monoecious**; **female flowers: stigmas** 3, spreading, 0.4-0.5 mm long, slender at base; **style** absent; **fruit** circumscissile, subglobose, 1.6-2.5 mm long, 0.9-1.2 mm broad, somewhat rugose on the upper half, stramineous or usually red; **seed** usually yellowish-white and dull, sometimes red to nearly black and lustrous, lenticular, round in outline, 0.9-1.2 mm in diameter, 0.5-0.6 mm thick, testa smooth; **sepals** 5, oblong, lance-oblong or spatulate, acute to attenuate, 1-nerved, usually red or purplish, but sometimes green, 1.4-2.0 mm long, 0.8-1.0 mm broad; **bract** lanceolate to ovate, 1.7-2.3 (-3.1) mm long, 0.9-1.1 mm broad, attenuate to a spinose subulate apex; **male flowers: stamens** 5; **filaments** membranaceous, 1.3-1.9 mm long; **anthers** ellipsoid, light yellow, ca. 0.8 mm long; **sepals** 5, oblong to ovate, 1.7-2.5 mm long, 0.5-0.9 mm broad, carinate, the midnerve excurrent as a pungent tip, usually tinged with red; **bract** lanceolate to ovate, 1.7-2.0 mm long, 0.7-0.8 mm broad; **inflorescences** terminal simple or compound spikes, terminal spikes usually pendant, (8-) 25-30 cm long, 0.8-1.0 cm broad, lateral spikes often lacking, or 2-7 cm long, 5-6 mm broad; **glomerules** bisexual, subsessile, closely congested; **leaves** alternate, lanceolate to ovate or rhombic-ovate, 3.5-10.0 (-20) cm long, 1.6-5.5 cm broad, apex acute or abruptly acute, base acute, conspicuously veined; **petioles** slender, 2-4 (-18) cm long, glabrous to sparsely tomentose; **stems** stout, erect, 3-10 (-20) dm tall [even larger in cultivation], striate, green or whitish often tinged with red, glabrous or sparsely villous around the inflorescence; **root system** annual with a taproot (2n = 32, 34).

Importance: This species is one of the grain amaranths that are important sources of food in some tropical countries. It is often grown as an ornamental or dye plant as well.

Variation: This species is probably derived through artificial selection from *A. hybridus*. Escaping populations are expected to cross with *A. hybridus* or revert to a wild state that does not exhibit the long "tail-like" inflorescence.

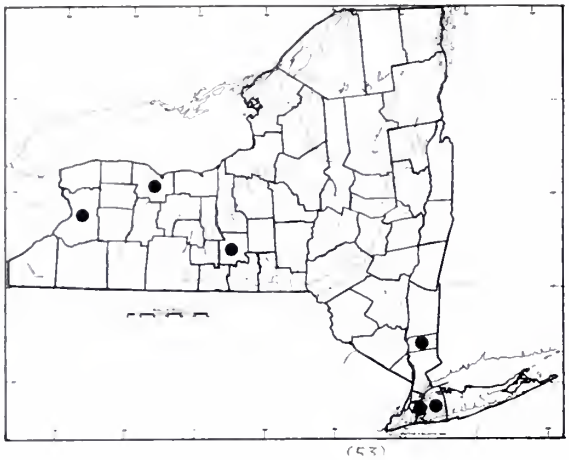
Waifs: *Amaranthus deflexus* L., with old reports from Albany, Schenectady, Richmond and Queens Counties; *Amaranthus palmeri* S. Wats., has been collected in Albany, Tompkins and Queens Counties.; *Amaranthus viridis* L. (*A. gracilis* Desf.), an old report from Rochester (Monroe Co.), Suffolk Co. and, recently, collected in Bronx County.

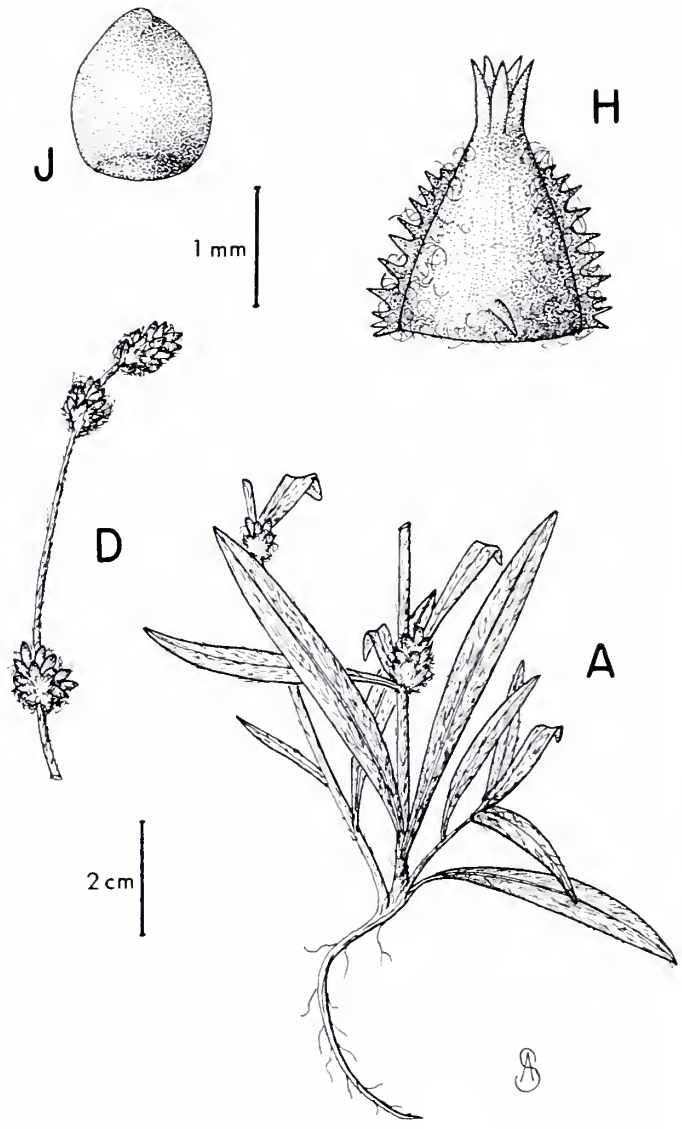
2. FROELICHIA

Common Name: Snake-cotton

Authority: Moench, Methodus, p. 50, 1794.

A genus of about 12 species, native to the Western Hemisphere from the middle latitudes of the United States south to Argentina and west to the Galapagos. Most species are found in the southwestern United States or Brazil. Two are known to occur in the eastern United States, but only one is reported from New York State. *Froelichia floridana* (Nutt.) Moq. var. *floridana* is found along the Coastal Plain as far north as New Jersey. It differs from *F. gracile* (Hook.) Moq. in having larger calyces (more than 5 mm long) with deeply and irregularly dentate crests and a profusely branching habit.





1. *Froelichia gracilis* (Hook.) Moq.

Common Names: Cotton-weed, Slender Snake-cotton

Type Description: W. J. Hooker, Icon. Pl., vol. 3, pl. 256, 1840

Synonym: *Oplotheca gracilis* Hook.

Origin: A native of the southwestern United States

Habitats: Sandy areas including sand dunes, prairies, pastures, stream valleys, sometimes in open woodlands; in eastern North America this species is often found on old cinders along railroads beds.

Habit: Erect or procumbent, taprooted annuals

Flowering: July-August

Fruiting: August-October

General Distribution: Probably native only west of the Mississippi River from Iowa to Colorado south to Texas and Chihuahua, Mexico; introduced in the east along railroads and highways, and now fairly widespread from New York to Ontario and Minnesota south to Florida

Description: Plants with **bisexual** flowers; **stigma** capitate, irregularly lobed, ca. 0.2 mm in diameter; **style** 1, 0.6-1.0 mm long; **ovary** 1, superior, unilocular, ovoid; **ovule** solitary, pendulous from the tip of the funiculus, the micropyle superior; **fruit** a membranaceous, indehiscent utricle, enclosed by the indurate calyx, 2.0-2.5 mm long, ca. 1.5 mm in diameter; **seed** 1, yellowish or reddish-brown, ovoid to pyriform, 1.2-1.7 mm long, ca. 1.2 mm in broad, testa smooth and usually lustrous; **embryo** annular, surrounded by a central, mealy **perisperm**, the **radicle** superior, usually germinating while enclosed within the calyx; **stamens** 5; **filaments** connate, the tube 1.8-3.0 mm long; **anthers** sessile on the staminal tube, alternating with 5 acute to obtuse lobes of the tube, ellipsoid, light yellow, 0.4-0.5 mm long; **perianth** a 5-lobed **calyx tube** that is conic to flask-shaped, 2.2-3.6 (-5) mm long, 1.7-2.2 mm broad (excluding spines), densely wooly with 2 lateral rows of distinct spines that are 0.4-0.9 mm long, the faces with 1-3 blunt or spine-like tubercles near the base; **calyx lobes** oblong linear, obtuse to acute, 0.7-1.4 mm long, 0.3-0.4 mm broad; **pedicels** very short, the flowers subsessile in spikes; **bracteoles** 2, detaching with the fruit, rotund, acute to emarginate (sometimes acuminate), scarious, 1.2-2.0 mm long, 1.5-1.8 mm broad, shorter than the calyx, white, yellowish, brownish, or blackish, glabrous; **peduncle** erect, 2.2-3.0 mm long, or absent from lateral spikes; **bract** at the base of the peduncle persistent, ovate, straminous to brown, scarious, (0.5-) 1.2-2.0 mm long, 0.7-0.9 mm broad, glabrate, apex acuminate; **inflorescence** a raceme of spikes 0.7-3.2 cm long, (5-) 7-8 (-10) mm broad, lateral spikes sessile; **leaves** opposite, entire, often clustered near the base, linear, linear-lanceolate, narrowly oblanceolate to elliptic-lanceolate, 2.2-7.0 (-12) cm long, 2-7 (-12) mm wide, acute to acuminate

at the apex, cuneate at the base, sericeous or tomentose to silky on both surfaces; **petioles** absent; **stems** slender, (1-) 2-5 (-7) dm tall, simple or usually much-branched at the base, the branches ascending or somewhat procumbent, densely or sparsely villous-tomentose and sometimes viscid above; **root system** annual with a single taproot.

3. GOMPHRENA

Common Name: Globe Amaranth

Authority: Linnaeus, Species Pl. I, p. 224, 1753

A genus of an estimated 100 species, mostly of the tropics, subtropics and warm-temperate regions of the New World, except for approximately 18 species native to Australia. The globe-amaranth (*Gomphrena globosa* L.) is commonly cultivated and occasionally escapes, but it does not persist in New York.

Waifs: *Gomphrena globosa* L. has been reported around New York City and from Orient Point, Suffolk Co.; *G. martiana* Gill. ex Moq. in DC., was collected earlier in the century near Yonkers wool mills, Westchester County.

4. ALTERNANTHERA

Common Name: Alligator-weed

Authority: Forsskål, Fl. Aegypt. Arab., p. 28, 1775

A genus of approximately 80 species (some estimates as high as 200). Most species occur in the American tropics and subtropics. Several species are aggressive weeds that have become naturalized in many parts of the world. None are persistent in New York.

Waif: *Alternanthera pungens* Kunz has been collected once in the past century from a wool-waste area in Yonkers (Westchester Co.), but it has not been seen since.

APPENDIX I

SOME FUNGI ASSOCIATED WITH PLANT SPECIES IN THIS TREATMENT

The following fungi associated with species in this treatment are listed to append the comprehensive treatment of fungal hosts published by Farr *et al.*, 1989. The reader is referred to that book for a more exhausted list of fungi. This list only includes species represented by specimens at the New York State Museum with host information.

PERONOSPORALES

Albugo bliti (Biv.-Bern.) Kuntze, on *Amaranthus retroflexus*, *A. viridis*, *A. cannabinus*

UREDINALES

Puccinia subnitens Diet., on *Atriplex hastata* [*A. prostrata*]
Uromyces shearianus Arthur, on *Atriplex hastata* [*A. prostrata*]

HYPHOMYCETES

Cercospora dubia (Pers.) Wint., on *Chenopodium album*
Cladosporium herbarum (Pers.) Link ex Fr., on *Chenopodium album*, *Amaranthus* sp.

APPENDIX II

A list of some insects associated with plant species in this treatment.

COLLEMBOLA

Bourletiella hortensis Fitch (Seedling Springtail), feeds on seedlings of *Chenopodium album* (Bassett & Crompton, 1978b)

THYSANOPTERA

Aeolothrips fasciatus L., on *Chenopodium album* (Bassett & Crompton, 1978b)
Haplothrips faurei Hd., on *Chenopodium album* (Leonard, 1928)
Taeniothrips vulgatissimus (Hal.), on *Chenopodium album* (Bassett & Crompton, 1978b)
Thrips fuscipennis (Hal.), on *Chenopodium album* (Bassett & Crompton, 1978b)
Thrips tabaci Lindemann, on *Chenopodium album* (Bassett &Crompton, 1978)

ORTHOPTERA

Orchelimum vulgare Harris (Common Meadow Katydid), laying eggs in *Chenopodium* (Leonard, 1928)

HEMIPTERA

Miridae
Atomoscelis modestus (Van Duzee), on *Chenopodium album* (Bassett & Crompton, 1978b)
Chlamydatus associatus (Uhler), on *Beta vulgaris* (Knight, 1941)
Lygus lineolaris (P. de B.), Tarnished Plant Bug, on *Chenopodium album* (Bassett & Crompton, 1978b), collected on *Amaranthus retroflexus* (Weaver & McWilliams, 1980)
Melanotrichus coagulatus Uhler, on *Chenopodium album* (Bassett & Crompton, 1978b)
Melanotrichus flavosparus Sahlb., on *Chenopodium album* (Bassett & Crompton, 1978b); on *Chenopodium album* and *Beta vulgaris* (Knight, 1941)
Reuteroscopus ornatus (Reuter) on *Chenopodium album* (Knight, 1941)
Reuteroscopus sulphureus (Reuter) on *Chenopodium album* (Knight, 1941)
Tingitidae
Corythaica venusta (Champion) on *Salsola pestifer* (Drake, 1965)
Derephysia foliacea (Fallén) on *Chenopodium* (Drake, 1965)
Orthotylus flavosparsus (Sahlb.), on *Chenopodium album* (Leonard, 1928)
Piesmatidae
Piesma cinereum (Say), food: *Chenopodium album* (Leonard, 1928), found on pigweed and many other plants, occurs throughout the US (Arnett, 1985)

HOMOPTERA

Aphidae
Aphis abbreviata Patch, feeding on *Chenopodium album* (Bassett & Crompton, 1978b)
Aphis brevisiphona Theobald, on *Beta vulgaris* and *Chenopodium* (Patch, 1938)
Aphis evonymi Fabricius on *Atriplex*, and *Beta vulgaris*, *Amaranthus retroflexus* (Patch, 1938)
Aphis fabae Scop., Bean Aphid, feeds on *Chenopodium album* (Bassett & Crompton, 1978b)
Aphis gillettei Cowen on *Amaranthus retroflexus* (Patch, 1938)
Aphis gossypii Glover, Cotton Aphid, feeds on *Chenopodium album* (Bassett & Crompton, 1978b)
Aphis helianthi Monell on *Amaranthus* (Patch, 1938)
Aphis laburni Kaltenbach, feeds on *Chenopodium album* (Bassett & Crompton, 1978b); on *C. album* and *Bassia hyssopifolia* (Patch, 1938)
Aphis maidi-radicis Forbes, feeds on *Chenopodium album* (Bassett & Crompton, 1978b); on *Amaranthus hybrids*, *A. retroflexus*, *A. spinosus* and *C. album* (Patch, 1938)
Aphis medicaginis Koch, feeds on *Chenopodium album* (Bassett & Crompton, 1978b); on *Amaranthus*, *Chenopodium album*, *Bassia scoparia*, and *Salsola pestifer* (Patch, 1938)

Aphis middletonii (Thomas), Erigeron Root Aphid, feeds on *Chenopodium album* (Bassett & Crompton, 1978b); on *Chenopodium album* and *Amaranthus retroflexus* (Patch, 1938)

Aphis ochropus Koch. on *Chenopodium polyspermum* (Patch, 1938)

Aphis papaveris Fab., feeds on *Chenopodium album* (Bassett & Crompton, 1978b); on *Beta vulgaris* and *Chenopodium album* (Patch, 1938)

Aphis rumicis L., feeds on *Chenopodium album* (Bassett & Crompton, 1978b); on *Atriplex hortensis*, *A. patula*, *Beta vulgaris*, *Chenopodium album*, *C. ambrosioides*, *C. polyspermum*, *Spinacea oleracea*, *Amaranthus retroflexus* (Patch, 1938)

Aphis spiraecola Patch, feeds on *Chenopodium album* (Bassett & Crompton, 1978b); on *C. album*, *C. ambrosioides*, and *Amaranthus* (Patch, 1938)

Bipersona torticauda Gillette on *Salsola pestifer* (Patch, 1938)

Forda betae Westwood on *Beta vulgaris* (Patch, 1938)

Hayhurstia atriplicis L., on *Chenopodium album* (Bassett & Crompton, 1978b)

Hyalopterus atriplicis L., feeds on *Chenopodium album* (Bassett & Crompton, 1978b); *Atriplex hastatum*, *A. hortensis*, *A. patula*, *Beta vulgaris*, *Chenopodium album*, *C. hybridum*, *C. murale*, *C. polyspermum*, *C. urbicum*, *C. vulvaria*, *Amaranthus paniculatus*, *A. retroflexus* (Patch, 1938)

Macrosiphum gei Koch, feeds on *Chenopodium album* (Bassett & Crompton, 1978b); *Atriplex*, *Beta vulgaris*, *Chenopodium album*, *Cycloloma atriplicifolia*, *Spinacea* (Patch, 1938)

Macrosiphum solanifolii Ashmead, feeds on *Chenopodium album* (Bassett & Crompton, 1978b); *Atriplex*, *Beta vulgaris*, *Chenopodium album*, *Spinacea oleracea*, *Amaranthus retroflexus*, *A. spinosus* (Patch, 1938)

Macrosiphum sonchi L. on *Beta vulgaris, Chenopodium* (Patch, 1938)

Macrosiphum schranki Theobald on Amaranthus *(Patch*, 1938)

Myzus persicae (Sulzer), green peach aphid, feeds on *Chenopodium album* (Bassett & Crompton, 1978b), *Amaranthus retroflexus* is an alternate host in peach and apple orchards in Washington State (Weaver & McWilliams, 1980); on *Atriplex*, *Beta vulgaris*, *Chenopodium album*, *C. murale*, *C. viride*, *Salsolakali*, *Salsola tragus*, *Spinacea oleracea*, *Amaranthus* (Patch, 1938)

Myzus pseudosolani Theobald, feeds on *Chenopodium album* (Bassett & Crompton, 1978b); on *Chenopodium album*, *Amaranthus hybridus*, and *A. retroflexus* (Patch, 1938).

Pemphigus balsamiferae Williams on *Beta vulgaris* (Patch, 1938)

Pemphigus betae Doane, feeds on lamb's quarters (Bassett & Crompton, 1978b); on *Beta vulgaris* and *Chenopodium album* (Patch, 1938)

Pemphigus bursarius L. on *Chenopodium* (Patch, 1938)

Pemphigus lactucae Fitch on *Beta vulgaris* (Patch, 1938)

Pemphigus erigeronensis on *Beta vulgaris* (Patch, 1938)

Semiaphis dauci Fabricius on *Chenopodium* (Patch, 1938)

Thecabius affinis Kaltenbach on *Chenopodium* (Patch, 1938)

Trifidaphis perniciosa Nevsky on *Beta, Chenopodium* (Patch, 1938)

Trifidaphis phaseoli Passerini on *Beta, Amaranthus "graecizans"* (native *A. albus* complex), *A. retroflexus* (Patch, 1938)

Trifidaphis radicicola on *Beta* and *Chenopodium* spp.

Xerophilaphis plotnikovi Nevsky on *Beta vulgaris* (Patch, 1938)

Xerophilaphis salsolacearum Nevsky on *Salsola* (Patch, 1938)

Cicadellidae

Eutettix tenella, (leaf-hopper that carries the curly-top disease of the sugar-beet) host plant.

LEPIDOPTERA

Lycaenidae

Brephidium exilis (Boisduval) on *Atriplex patula*, *A. prostrata*, *Chenopodium* (Tietz, 1972)

Plebulina emigdionis (Grinnell) on *Atriplex* sp. (Tietz, 1972)

Sphingidae

Hyles lineata (Fab.) on *Beta vulgaris*, *Chenopodium*, *Amaranthus* (Tietz, 1972)

Arctiidae

Apantesis arge (Drury) on *Chenopodium* (Tietz, 1972)

Apantesis virgo (L.) on *Chenopodium* (Tietz, 1972)

Diacrisia virginica (Fab.) on *Beta vulgaris*, *Amaranthus* (Tietz, 1972)

Estigmene acrea (Drury) on *Beta vulgaris*, *Amaranthus spinosus* (Tietz, 1972)

Isia isabella (Abbott & Smith) on *Beta vulgaris* (Tietz, 1972)

Coleophoridae

Coleophora amaranthella Braun, feeds on seed of *Amaranthus hybridus* (Forbes, 1923)

Coleophora annulatella Tengstr., larva eats seeds of *Chenopodium* spp. and *Atriplex* spp. (Bassett & Crompton, 1978b)

Coleophora lineapulvella (Chambers), severe seed predation on *Amaranthus retroflexus* and *A. hybridus* (Weaver & McWilliams, 1980).

Gelechiidae

Chrysopora hermannella Fab., on *Chenopodium* (Leonard, 1928), (Forbes, 1923)

Chrysopora linguiacella Clemens, on *Chenopodium* (Forbes, 1923)

Chrysoesthia hermonella Fab., on *Chenopodium album* (Bassett & Crompton, 1978b)

Gnorimoschema chenopodiella Bsk., *Chenopodium* (Leonard, 1928)

Scrobipalpa absaletella Fisch. v. Rossl., mines leaves of *Chenopodium album* (Bassett & Crompton, 1978b)

Scrobipalpa atriplicella Fisch. v. Rossl., on *Chenopodium album* (Bassett & Crompton, 1978b)

Scrobipalpa nitentella Fuchs, eats flowers and seeds of *Chenopodium album* (Bassett & Crompton, 1978b)

Hesperiidae

Erynnis martialis (Seudder) on *Amaranthus* sp., *A. retroflexus* (Tietz, 1972)

Pholisora catullus (Fab.), Sooty-wing, *Chenopodium album*, *Amaranthus* (Leonard, 1928), larvae feed on lamb's quarters, other Chenopodiaeeae and Amaranthaeeae (Arnett, 1985); on *Amaranthus* (Tietz, 1972)

Pyralidae

Blepharomastix ranalis Guen., *Chenopodium* (Leonard, 1928) (Forbes, 1923)

Herpetogramme bipunctalis (Fab.) on *Beta vulgaris* (Forbes, 1923)

Hymenia fascialis Cr., Hawaiian Beet-webworm, beet, chard, *Amaranthus*, and various weeds (Leonard, 1928); *Beta vulgaris* and *Amaranthus* (Forbes, 1923)

Hymenia perspectalis (Hbn.), Spotted Beet Webworm, larva on Beet and chard (Leonard, 1928), larvae feed on beets, chard (Arnett, 1985); on *Beta vulgaris* (Forbes, 1923)

Loxostege sticticalis (L.), Sugar-beet Webworm (Leonard, 1928), larvae general feeders, including on cultivated plants (Arnett, 1985) (Forbes, 1923)

Ostrinia nubilalis (Hb.), European Corn Borer, *Amaranthus retroflexus* is severely attacked (Weaver & McWilliams, 1980)

Geometridae

Eupithecia subnotata Hb., larvae feed on flowers and seeds of *Chenopodium album* (Bassett & Crompton, 1978b)

Noctuidae

Agrotis ipsilon (Hufnagel), Black Cutworm Moth, larvae can survive and pupate on *Amaranthus retroflexus* in Indiana (Weaver & McWilliams, 1980); on *Beta vulgaris* (Tietz, 1972)

Agrotis malefida Guenee on *Beta vulgaris* (Tietz, 1972)

Agrotis orthogonia (Morrison) on *Beta vulgaris* (Tietz, 1972)

Agrotis subterranea (fab.) on *Beta vulgaris*, *Amaranthus* (Tietz, 1972)

Anicla infecta (Ochsenheimer) on *Beta vulgaris* (Tietz, 1972)

Apamea devastator (Brace) on *Beta vulgaris* (Tietz, 1972)

Autographa californica (Speyer), Alfalfa Looper, larvae have been collected on *Amaranthus* sp. in California (Weaver & McWilliams, 1980); on *Beta vulgaris* (Tietz, 1972)

Autographa falcifer Kirby on *Beta vulgaris* (Tietz, 1972)

Autographa ni (Hubner) on *Beta vulgaris* (Tietz, 1972)

Autophusia egena (Gn.), Bean Leaf Skeletonizer, larvae have been collected on *Amaranthus* sp. in California (Weaver & McWilliams, 1980)

Euxoa auxiliaris (Grote) on *Beta vulgaris* (Tietz, 1972)

Euxoa laetificans (Smith) on *Beta vulgaris* (Tietz, 1972)

Euxoa messoria (Harris) on *Beta vulgaris* (Tietz, 1972)

Euxoa munis (Grote) on *Beta vulgaris* (Tietz, 1972)

Euxoa ochrogaster (Guenee) on *Beta vulgaris* (Tietz, 1972)

Euxoa tessellata (Harris) on *Beta vulgaris* (Tietz, 1972)

Euxoa tristicula (Morrison) on *Beta vulgaris* (Tietz, 1972)

Heliothis zea (Boddie) on *Amaranthus* sp. (Tietz, 1972)

Mamestra configurata Walker on *Beta vulgaris* (Tietz, 1972)

Melanchra picta (Harris) on *Beta vulgaris* (Tietz, 1972)

Ochropleura plecta (L.) on *Beta vulgaris* (Tietz, 1972)
Papaipema nebris (Guenee) on *Beta vulgaris* (Tietz, 1972)
Peridroma margaritosa (Haworth) on *Beta vulgaris* (Tietz, 1972)
Pseudaletia unipuncta (Haworth) on *Beta vulgaris* (Tietz, 1972)
Scotogramma trifolii (Rottenburg), feeds on young plants of *Chenopodium album* (Bassett & Crompton, 1978b); on *Beta vulgaris* (Tietz, 1972)
Spodoptera eridania (Cramer) on *Beta vulgaris*, *A. retroflexus* (Tietz, 1972)
Spodoptera exigua (Hubner) on *Beta vulgaris*, *Atriplex* sp., *Amaranthus retroflexus* (Tietz, 1972)
Spodoptera frugiperda (Abbot & Smith) on *Beta vulgaris* (Tietz, 1972)
Spodoptera ornithogalli Guenee on *Beta vulgaris*, *Amaranthus retroflexus*, *A. spinosus* (Tietz, 1972)
Spodoptera praefica Grote on *Beta vulgaris* (Tietz, 1972)
Trichoplusia ni Hb., Cabbage Looper, larvae have been collected on *Amaranthus* species in California (Weaver & McWilliams, 1980)
Xestia c-nigrum (L.) on *Beta vulgaris* (Tietz, 1972)

DIPTERA

Agromyzidae
Agromyza pusilla Meig., on *Amaranthus viridis* (Cuba), *Beta vulgaris*, *Spinacia oleracea* (North America) (Frost, 1923)
Agromyza scutellata Fall., *Chenopodium botrys* (NA) (Frost, 1923)
Phytomyza affinis Fall., *Spinacia oleracea* (Europe) (Frost, 1923)
Phytomyza albiceps Meig., on *Atriplex sp* (Europe) (Frost, 1923)
Drosophilidae
Scaptomyza adusta Loew, on *Amaranthus retroflexus* (NA) (Frost, 1923)
Scaptomyza graminium Fall., *Chenopodium album* (Europe) (Frost, 1923)
Ephydridae
Hydrellia leucotoma Meig, *Chenopodium album* (Europe) (Frost, 1923)
Oscinidae
Chlorops assimilis Macq., *Beta vulgaris* (Europe) (Frost, 1923)
Anthomyiidae
Hylemyia betarum Lint., *Beta vulgaris* (NA) (Frost, 1923)
Hylemyia floccosa Macq., *Beta vulgaris* (NA) (Frost, 1923)
Hylemyia fugax Meig., host plants: *Amaranthus retroflexus*, *Beta vulgaris*, *Chenopodium album*, *Spinacia oleracea* (NA) (Frost, 1923)
Hylemyia substriata Stein., *Beta vulgaris*, *Beta vulgaris* var. *macrorhiza* (NA) (Frost, 1923)
Pegomyia betae (Curtis), Beet Leaf Miner, Spinach Leaf Miner, this species mines the leaves of beets, spinach, and similar plants (Arnett, 1985)
Pegomyia hyoscyami Panz., Spinach Leaf Miner, larvae mine leaves of beet, spinach, *Chenopodium* (Leonard, 1928); *Amaranthus retroflexus*, *Atriplex hortensis*, *Atriplex patula*, *Beta vulgaris* (NA), *Beta vulgaris* var. *macrorhiza* (Europe), *Chenopodium album* (NA), *Chenopodium murale* (Europe), *Spinacia oleracea* (NA) (Frost, 1923)
Pegomyia nigritarsis Zett., *Atriplex patula*, *Beta vulgaris*, *Chenopodium album* (Europe) (Frost, 1923)
Pegomyia ruficeps Stein, *Beta vulgaris* (NA) (Frost, 1923)
Pegomyia sulcans Rond., *Chenopodium* sp. (Europe) (Frost, 1923)

COLEOPTERA

Chrysomelidae
Systena frontalis (Fr.), Red-headed Flea Beetle, *Amaranthus retroflexus* is a major food plant of the fleabeetle in Iowa (Weaver & McWilliams, 1980)
Curculionidae
Cosmobaris americana Casey, reported to attack members of the Amaranthaceae as well as sugar beets throughout the United States (Weaver & McWilliams, 1980)

Braconidae

Agathirsia sancta (Say), host is *Pholisora catullus*, the larvae of which are known to devour goosefoot or pigweed (*Chenopodium*) and amaranth (*Amaranthus*) (Viereck, 1916)

Apanteles trachynotus Viereck, claims to have been reared from *Pegomyia vicina*, infesting *Chenopodium* (Viereck, 1916)

Microbracon auripes (Prov.), a parasite of lepidopterous larvae boring in such weeds as *Amaranthus* (Leonard, 1928)

Microplitis mamestrae Weed., parasitic upon the painted mamestra (*Mamestra picta*), the larva of which is especially destructive to cabbages and beets (Viereck, 1916)

Eulophidae

Sympiesis chenopodii Ashmead, reared from a *Lithocolletis* miner of *Chenopodium hybridum* (Viereck, 1916)

Apoidea

Andrena piperi Viereck visits flowers of *Salsola kali* (Krombein *et al.*, 1979)

Dianthidium dubium dilectum Timberlake visits flowers of *Chenopodium* (Krombein *et al.*, 1979)

Dianthidium subparvum Swenk. visits flowers of *Chenopodium* (Krombein *et al.*, 1979)

Hylaeus bisinuatus Forster visits flowers of Amaranthaceae (Krombein *et al.*, 1979)

Hylaeus conspicuus (Metz.) Wash. visits flowers of *Salsola kali* (Krombein *et al.*, 1979)

Megachile policaris Say. visits flowers of *Salsola* (Krombein *et al.*, 1979)

Megachile sidalceae Cockerell visits flowers of *Salsola* (Krombein *et al.*, 1979)

Megachile wheeleri Sask. visits flowers of *Chenopodium* (Krombein *et al.*, 1979)

Melissodes coreopsis Robertson visits flowers of *Salsola pestifer* (Krombein *et al.*, 1979)

Melissodes paulula LaBerge visits flowers of *Salsola kali* (Krombein *et al.*, 1979)

Melissodes subagilis Cockerell visits flowers of *Salsola kali* (Krombein *et al.*, 1979)

Melissodes tepida timberlakei Cockerell visits flowers of *Salsola kali* (Krombein *et al.*, 1979)

Melissodes tristis Cockerell visits flowers of *Salsola kali* and *S. pestifer* (Krombein *et al.*, 1979)

Nomia melanderi Cockerell visits flowers of *Beta vulgaris* and *Salsola kali* (Krombein *et al.*, 1979)

Perdita calloleuca calloleuca Cockerell. visits flowers of *Salsola kali* (Krombein *et al.*, 1979)

Perdita calloleuca convergens Timberlake visits flowers of *Suaeda* (Krombein *et al.*, 1979)

Perdita zebrata flavens Timberlake visits flowers of *Salsola kali* (Krombein *et al.*, 1979)

APPENDIX III

MISCELLANEOUS PARASITES

Nematodes

Aphelenchoides fragariae (Ritz.-Bos), on *Amaranthus* spp. (Weaver & McWilliams, 1980)

Ditylenchus dipsaci (Kuehn) Filip., on *Chenopodium album* (Bassett & Crompton, 1978b)

Heteroda Marioni (Cornu) A. Schm., on *Amaranthus* spp. (Weaver & McWilliams, 1980)

Meloidogyne raedicicola (Greef.), on *Amaranthus* spp. (Weaver & McWilliams, 1980)

Meloidogyne sp., on *Chenopodium album* (Bassett & Crompton, 1978b) .

Pratylenchus pratensis (DeMan) Filip., on *Amaranthus* spp. (Weaver & McWilliams, 1980), on *Chenopodium album* (Bassett & Crompton, 1978b)

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